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FECTS OF SEVERE RICKETS IN EARLY CHILDHOOD ON SKELETAL DEVELOPMENT IN ADOLESCENCE

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WASHINGTON, D. C. NEW HAVEN, CONN.

A group of 10 children who in early childhood d shown evidence of severe rickets in ntgenograms of the wrist[1] were reexamined adolescence with a view to determining the ct of early rickets on their skeletal develop- nt. These 10 subjects were selected because y were examples of the most severe and pro- ged type of rickets occurring in early child- od and not because of any special abnormali- s in adolescence. Six of the children were ys, and 4 were girls; 9 (all of Italian parent- e) were white, and 1 was a Negro.

Each adolescent child received a physical amination; the sitting height and the standing ight were measured and pelvic roentgenograms re made.[2]

CASE 1.—Figure 1 *A* shows a boy (P. C.) who en- ed the New Haven Hospital at the age of 2½ years. hen he was admitted to the hospital he was not able stand, and the history stated that at home he had nt his waking hours sitting in a soap box in the ical rachitic posture. The roentgenograms of his ists made at the time of his admission showed severe kets (fig. 1 *B*). In the first film (at right) the zone calcification is not discernible, but after he had re- ved treatment the zone became more distinct, as is wn in the middle film. After he had received inten- e treatment for nearly five months there was con- erable healing, as is shown in the left hand film.

Figure 2 *A* shows this boy after two or three months treatment; at that time he could stand with some pport. Note the classic signs of rickets: relatively large head, enlarged epiphyses of the wrists, thoracic deformity, pot belly, bowed thighs and knock knees. When the child was reexamined four years later when he was 6½ years of age, at the clinic of the Children's Bureau, his physical condition had greatly improved (fig. 2 *B*), although slight skeletal deformities were still evident and roentgenograms showed that the rachitic process was still present in a low grade form. Figure 3 shows the patient in adolescence (19 years old). At that time he still had skeletal deformities (bowed thighs, knock knees and lordosis). Roentgenograms of the pelvis taken at the same time as the photograph showed rachitic deformities (fig. 4 *A* and *B*).

Fig. 1 (case 1).—*A*, the patient at the age of 2½ years; *B*, roentgenograms of P. C.'s wrists.

CASE 2.—A. C. was a younger brother of the boy just described. When first examined, at 2 years of age, he also showed evidence of severe rickets in roentgenograms of the wrists, but not in so great a degree as his brother. The history stated that he had received 3 teaspoons of cod liver oil daily since he was 3 months old. This statement seems highly improbable, however, because at the age of 2 years roentgenograms of the wrists showed evidences of pronounced active rickets. At that time treatment was started, and six months later there was notable deposition of calcium in the bones.

In adolescence the child showed only slight knock-knees on physical examination, but roentgenograms of the pelvis showed definite rachitic deformities.

Read at the Fifty-Fifth Annual Meeting of the erican Pediatric Society, Sept. 27, 1944, Atlantic y, N. J.

From the Children's Bureau, United States Depart- nt of Labor, and the Department of Obstetrics and necology, Yale University School of Medicine.

1. Eliot, M. M.: The Control of Rickets, J. A. . A. 85:656-661 (Aug. 29) 1925.

2. These 10 children were selected from a group of 2 adolescent children studied in the manner described ove, who formed the basis for a report by Dunham, ss, Thoms, Moloy and Dippel, to be published.

CASE 3.—Figure 5 *A* shows the younger sister (M. C.) of these 2 boys, who was admitted to the New Haven Hospital at 8 months of age, with severe tetany. Roentgenograms of her wrists at that time showed severe rickets. She received intensive antirachitic treatment for four months, while she was in the hospital, and an indefinite amount of treatment thereafter. When reexamined, at 4 years of age, she had noticeable bow legs and some lordosis (fig. 5 *B* and *C*). Figure 6 shows a series of roentgenograms of wrists. At the right is a film taken when she 8 months old, which shows evidence of severe a rickets. The middle film, taken when the child 4 years old, still shows severe rickets, with s

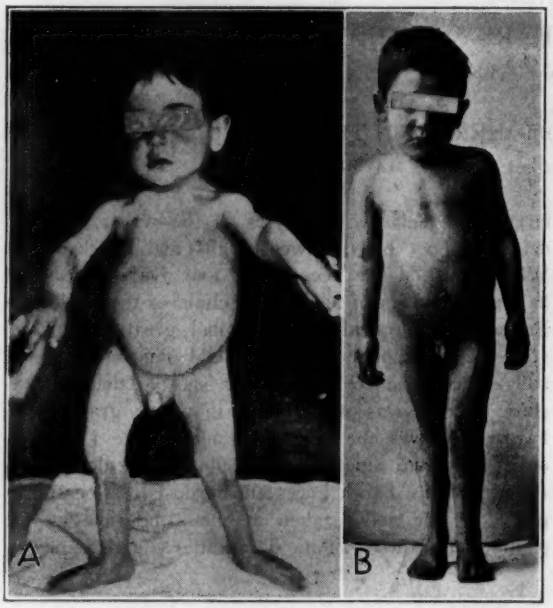


Fig. 2 (case 1).—*A*, the patient after two or three months of treatment; *B*, the patient four years later.

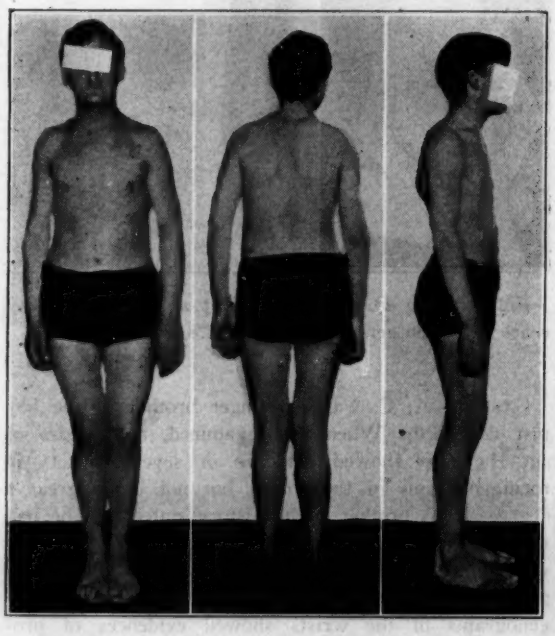


Fig. 3 (case 1).—The patient in adolescence

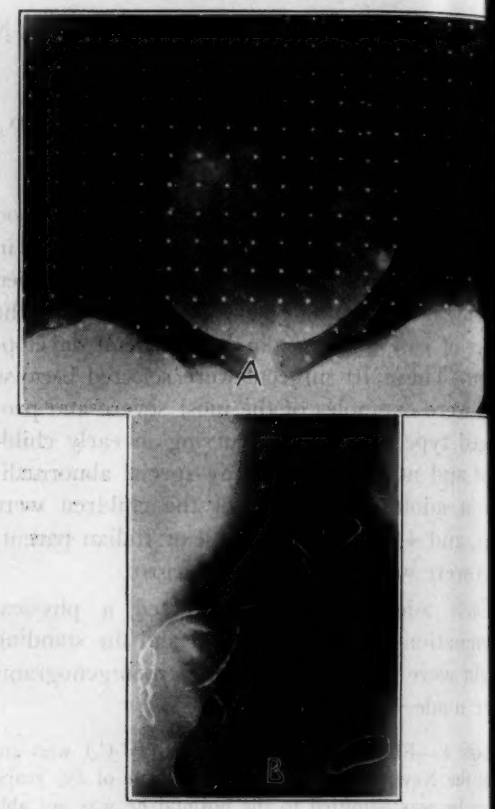


Fig. 4 (case 1).—*A*, inlet, showing typical flatte pelvis, with shortening of the posterior segment; lateral view, showing sacrum convex from above do ward. The lower pole is backwardly displaced. symphysis-promontory distance is shortened. Typ rachitic changes are present.

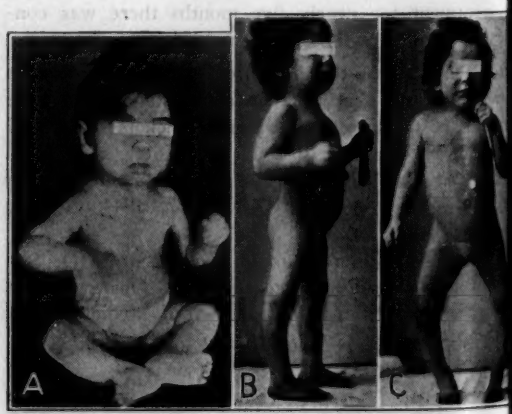


Fig. 5 (case 3).—*A*, the patient at 8 months of a *B* and *C*, the patient at 4 years of age.

dence of healing. The left hand film, taken when was 9 years old, shows the scars of the rachitic cess. When this girl was reexamined in adolesce, at 15 years, the only deformity she had was ht bow legs, and the pelvic roentgenograms were mal (fig. 7 *A* and *B*).

The children in these 3 cases all belonged to family. All 3 had severe chronic rickets in y childhood. In adolescence the 2 boys had hitic pelves, but the girl, who was younger at time the diagnosis of rickets was made and was therefore treated at an earlier age, had ormal pelvis in adolescence.

CASE 4.—J. C., a girl, was 1 year and 4 months old n first examined. At that time she had bow legs, roentgenograms showed evidence of severe active

Fig. 6 (case 3).—Roentgenograms of the patient's ists.

kets (fig. 8 *A;* note fracture in the radius). She received no cod liver oil. A photograph taken n she was nearly 7 years old shows pronounced ormities of the legs, of an unusual type, and scoliosis . 8 *B* and *C*). In adolescence, although the defor- ies were less severe, they were still pronounced . 9). The pelvic roentgenograms showed rachitic ormities.

CASE 5.—L. C., an older brother of J. C., was 2½ rs old when first examined. He had pronounced legs at that time, and roentgenograms of the ists showed severe rickets, with a moderate degree healing. This boy received no cod liver oil. Roentograms taken when he was 16 years old showed evidences of rachitic pelvis.

CASE 6.—An older sister (R. C.) of these 2 children s 4 years old when first examined. At that time she had pronounced knock knees and bowing of the thighs. Roentgenograms of the wrists showed rickets that had healed. Roentgenograms made during her adolescence showed rachitic deformities.

CASE 7.—D. G., a boy, could not walk when he was 4 years and 9 months old. One photograph (fig. 10 *A*) shows the child sitting in the typical rachitic posture; another (fig. 10 *B*), in which he is standing, shows severe skeletal deformities. Figure 11 shows roentgenograms of his wrists made at different ages. In the right hand film, made when the boy was nearly 5 years old, there is a severe hypertrophic type of rickets,

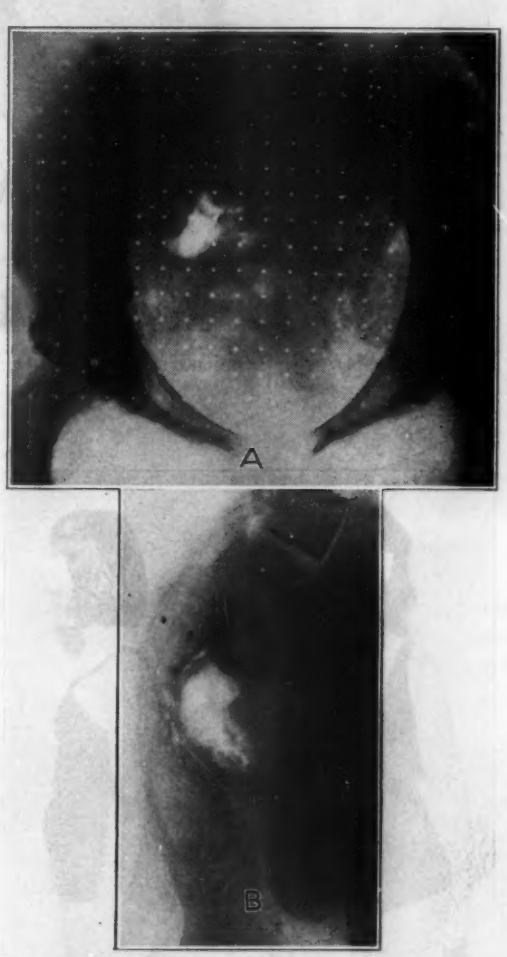


Fig. 7 (case 3).—Roentgenograms of the pelvis. *A*, inlet view, showing fine round symmetric form. *B*, lateral view, showing normal sweeping sacral curve. The relation between promontory and symphysis is normal. No rickets is present.

with curvature of the radius and the ulna, which persisted. The middle and left hand films, made when he was 7½ and 8½ years old respectively, show gradual improvement. When he was 9 years old, bilateral osteotomies were performed to straighten his legs. Figure 12 shows photographs of the boy at various ages. In adolescence he had a slight spinal curvature

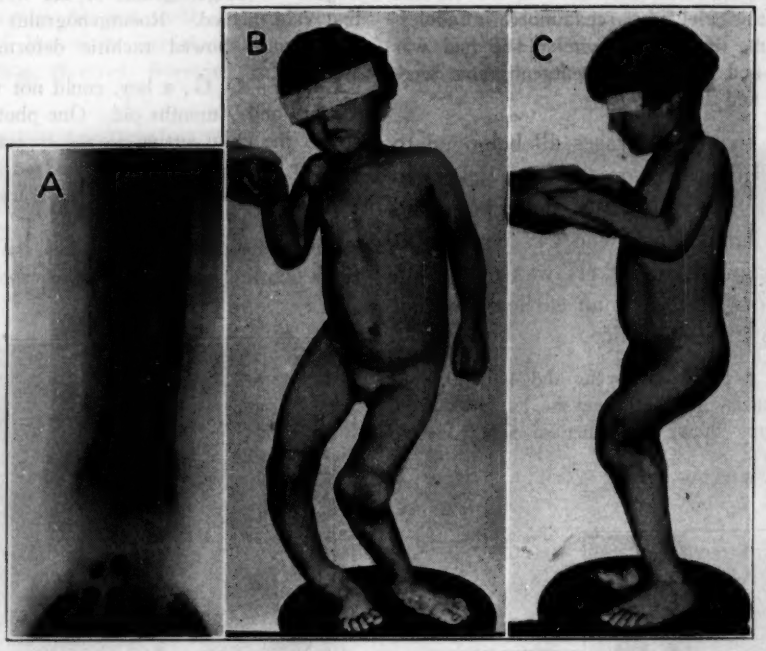


Fig. 8 (case 4).—*A*, roentgenogram of a wrist; *B* and *C*, photographs of the patient at nearly 7 y of age.

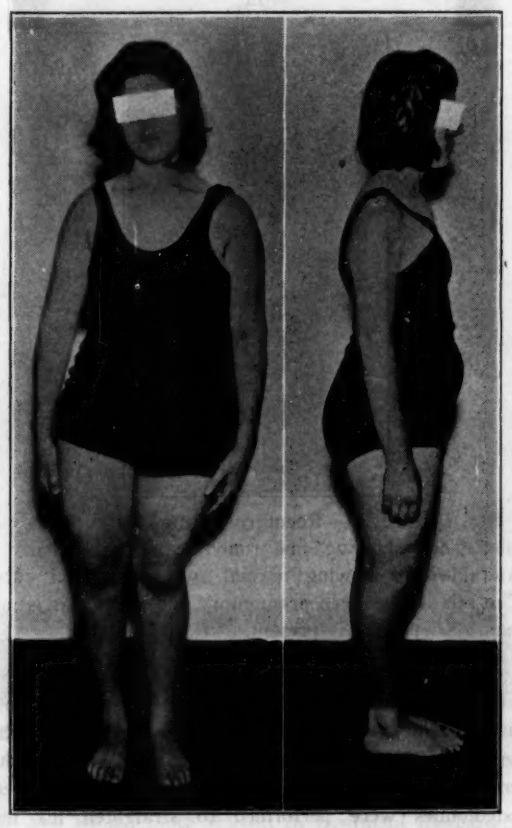


Fig. 9 (case 4).—The patient in adolescence.

(fig. 13), and pelvic roentgenograms showed rac deformities.

CASE 8.—A. R., a boy, was first seen when he 3 years old; at that time he was unable to w There was no record that he had previously rece cod liver oil. A photograph of this subject at 3 y

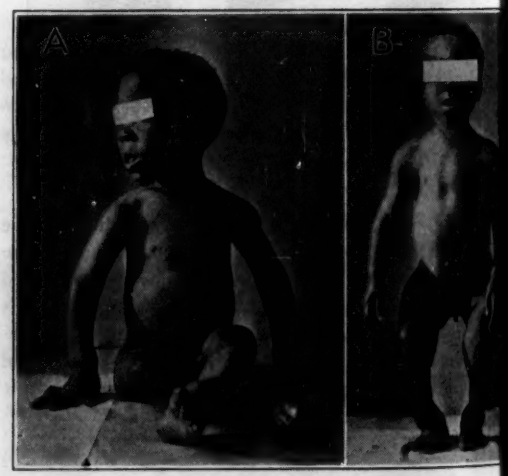


Fig. 10 (case 7).—The patient at 4 years and 9 mon

of age shows him sitting in the typical rachitic pos (fig. 14 *A*). Figure 14 *B* and *C* shows him at the s age, standing; deformities of the skeleton character of rickets (bow legs and lordosis) are obvious. Ro genograms of the wrists showed severe active ric (fig. 15 *A*; note fracture of the right radius). At

ars of age this boy still showed pronounced bow legs d slight lordosis (fig. 15 *B*). Roentgenograms made at t time showed a normal pelvis.

CASE 9.—A younger brother (J. R.) of this boy was st seen when he was 1½ years old. He also had nounced bow legs, and roentgenograms of his wrists

Fig. 11 (case 7).—Roentgenograms of the patient's rists at 5½ years, 7½ years and 8½ years showing adual improvement.

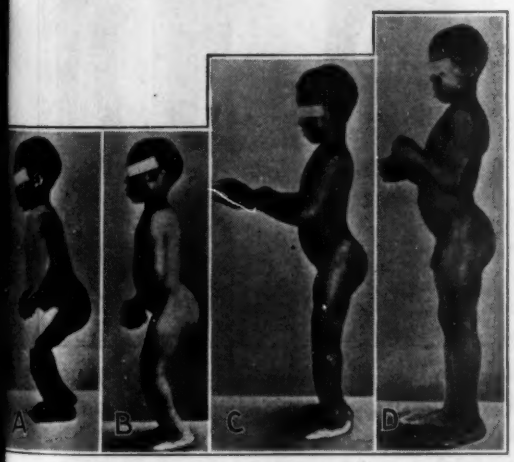


Fig. 12 (case 7).—Photographs of the patient at rious ages. *A*, 5 years; *B*, 6 years; *C*, 7 years and 6 nths; *D*, 10 years (osteotomy performed on tibias one ar previously).

owed severe rickets. He had been given some cod er oil for a month or two before he was examined. adolescence he had slight bow legs and slight lordosis but showed no roentgenographic evidence of rachitic pelvis.

The history of this boy, like that of the boy in case 1, would make it seem likely that a rachitic pelvis would develop, and it is hard to understand why no evidences of rickets were found in adolescence.

CASE 10.—The last case is that of a girl (P. C.), first examined at the age of 1½ years. Her only

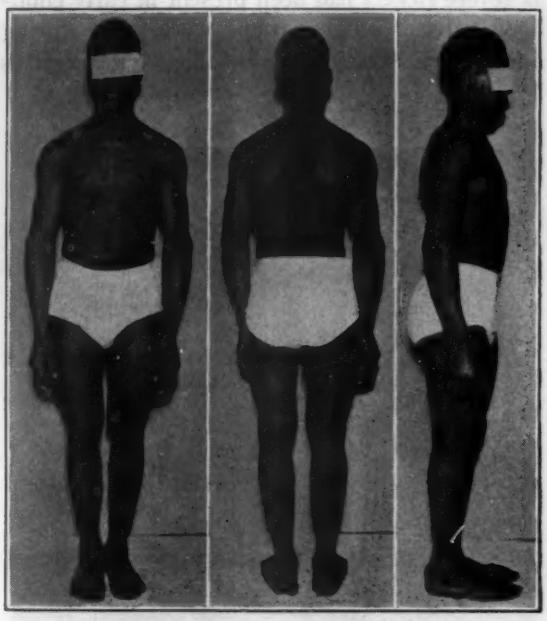


Fig. 13 (case 7).—The patient in adolescence.

skeletal deformity at that time was pronounced bow legs (fig. 16 *A*). Roentgenograms of the wrists showed evidences of moderate active rickets (fig. 16 *B*). When

Fig. 14 (case 8).—The patient at the age of 3 years.

the child was reexamined, about eight months later, at a little over 2 years of age, roentgenograms showed a more severe degree of rickets, and it was found that she had not been given the prescribed antirachitic treatment. Treatment was then begun, and after about four months evidences of advanced healing were found

in the rachitic zone. At 8 years of age she still had moderate bowing of the thighs and legs (fig. 17). In adolescence (at 16 years) she had only slight, if any, bowing of the legs (fig. 18). The pelvic diagnosis was "normal."

SUMMARY AND COMMENT

For 10 children in whom a condition diagnosed as severe rickets had been present in early childhood pelvic roentgenograms were made during adolescence. On the basis of the pelvic diagnosis

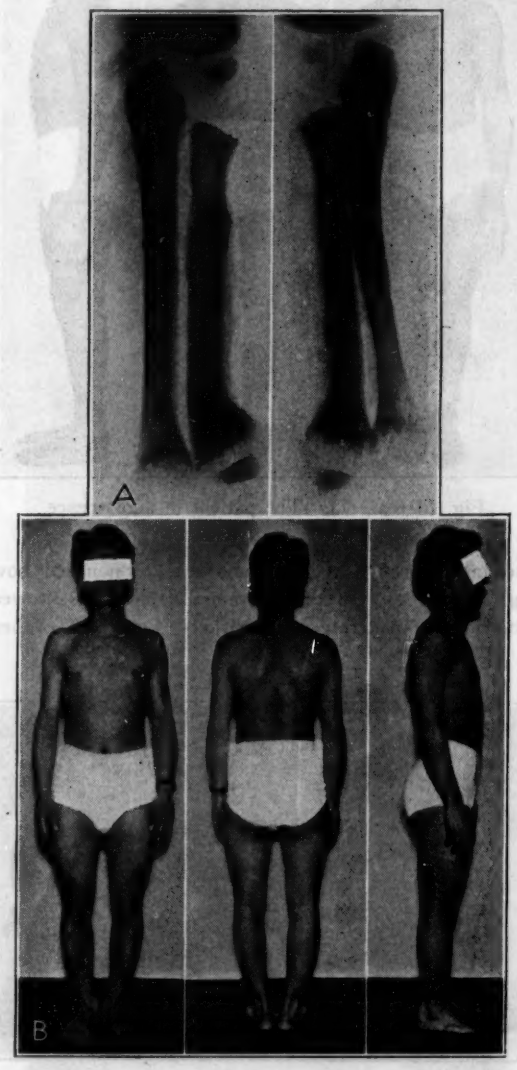


Fig. 15 (case 8).—*A*, roentgenograms of the wrists, made when the patient was 3 years old; *B*, the patient at the age of 17 years.

these 10 children fall into two groups: 5 children who had rachitic pelves in adolescence and 5 who had nonrachitic pelves.

What evidence is there of a relationship t tween the early histories of these two groups children and their status in adolescence?

In regard to the age when rickets was kno to be active, it was found that of the 5 adolesc children who had rachitic pelves 3 were m than 4 years of age when active rickets w

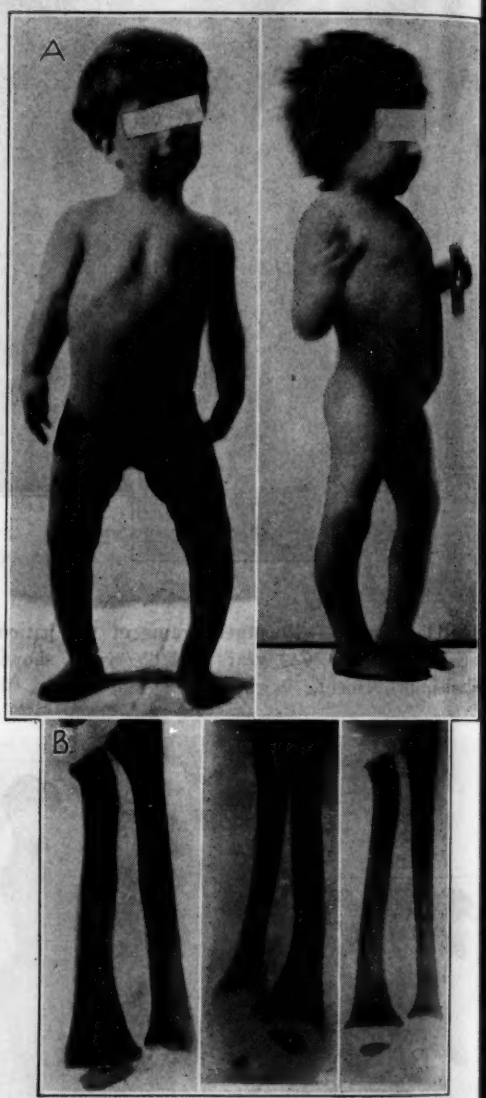
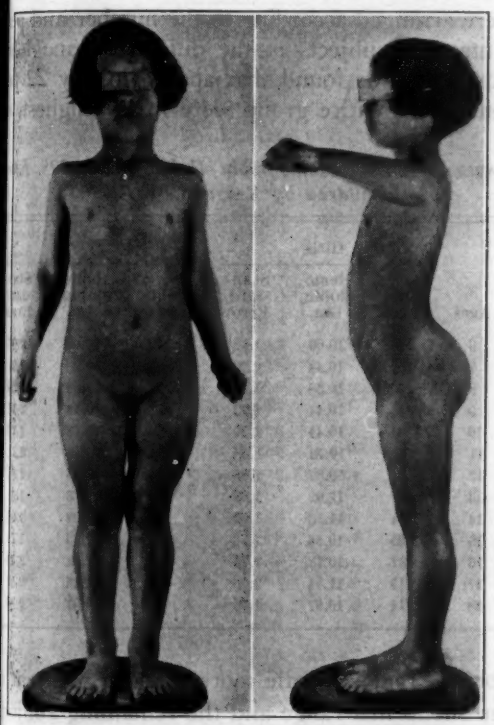


Fig. 16 (case 10).—*A*, photographs of the patient the age of 1½ years; *B*, roentgenograms of the wris

diagnosed; of the 5 whose pelves were norm 4 were less than 3 years of age when active rick was diagnosed. Apparently, the older the ch at the time when active rickets of a moderate severe degree is present, the greater is the chan that the pelvis will show rachitic deformities adolescence.

In regard to physical development in early ildhood, as indicated by the age at which the ildren were able to sit and to stand, no strik- differences were found in the two groups. ll the children were able to sit alone before they ched 1 year of age, and 3 children in the oup with rachitic pelves and 2 in the group ith nonrachitic pelves did not walk until they ere 2 years of age or older.

Physical examinations showed that all 10 ildren had in adolescence some deformity of the wer extremities. In the children who had had were rickets in early childhood knock knees ere associated more often with rachitic deformi- s of the pelvis than were bow legs.



ig. 17 (case 10).—The patient at the age of 8 years.

Severe or moderate deformities of the spine r of the lower extremities were found in early ildhood as often in the group with normal lves in adolescence as in the group with chitic pelves. Differences in the two groups ere found, however, in the incidence of knock nees in early childhood: Of the 5 children with rachitic pelves in adolescence 2 had had knock knees in early childhood and 2 had had bow legs (the status of 1 was not known). Of the 5 children with normal pelves none had had knock knees in early childhood. These observations suggest that if knock knees were present in early childhood the pelvis in adolescence is more likely to show the deformities of rickets than if bow

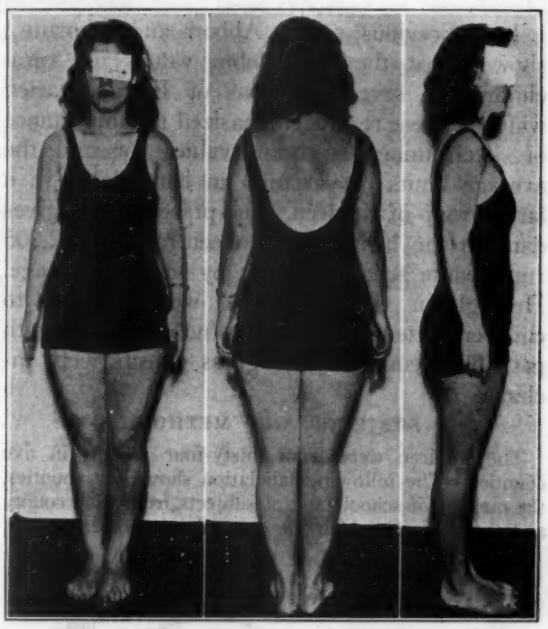


Fig. 18 (case 10).—The patient in adolescence.

legs were present in early childhood. It is perhaps significant that 1 of the children who had had bow legs in early childhood had in adolescence an unusual deformity that resulted in outward curvature of one leg and inward curvature of the other.

As is well known, high ratios of sitting height to standing height are considered evidence of retardation of growth of the lower extremities. High ratios were found for all but 1 of the children; this observation includes both the children with rachitic and those with nonrachitic pelves. One child with a rachitic pelvis had a normal ratio, and 1 was not measured.

United States Department of Labor.

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HEMOGLOBIN VALUES FOR 2,205 RURAL SCHOOL CHILDREN IN FLORIDA

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In a previous report Abbott and Ahmann [1] showed that the hemoglobin values for rural children in several sections of Florida varied widely. These results emphasized the importance of determining the mean values for and the average limits of variation in hemoglobin in a large group of children. The present study gives data on the hemoglobin concentration of 2,205 rural white school children by sex and by age. Hemoglobin determinations were limited to children attending school; no children with pathologic conditions or gross defects were included.

SUBJECTS AND METHOD

The children were from thirty-four schools in five counties. The following tabulation shows the counties, the number of schools and of subjects from each county and the years in which the determinations were made:

County	No. of Schools	No. of Children	Years
Citrus	12	218	1938-1939
Levy	7	558	1939
Lafayette	1	206	1940-1941
Marion	5	796	1941-1942
Alachua	9	427	1940-1942

Hemoglobin.—Hemoglobin was determined by a Fisher electrohemometer. This instrument is designed for determination of hemoglobin by the acid-hematin method. It employs a photoelectric cell in place of the human eye, thereby eliminating errors in matching colors and in variations resulting from eyestrain.

In making comparisons of the hemoglobin levels of the children three more or less arbitrary ranges were set up: normal, (hemoglobin values above 13.6 Gm. per hundred cubic centimeters), subnormal (11.4 to 13.6 Gm.) and anemic (3.6 to 11.4 Gm.). Since the hemoglobin values in the anemic range varied widely, this range was subdivided as follows: 9 to 11.4 Gm., 6.1 to 9 Gm. and 3.6 to 6.1 Gm. per hundred cubic centimeters.

EXPERIMENTAL RESULTS

The mean hemoglobin values in grams per hundred cubic centimeters of blood for 2,205 rural school children are presented by sex and by age in table 1. The differences in the values for girls and those for boys were slight before the age of 12 years; at this age the girls had t higher value. The girls also had the higher val at the age of 17, but at the age of 18 the valu for the sexes were the same, both having dropp to preadolescent levels.

Table 2 gives a more detailed analysis of t data summarized in table 1. When the da were arranged according to the number and pe centage of subjects in the different hemoglob ranges, it was found that approximately 22 p cent of the entire group were in the highest,

TABLE 1.—*Mean Hemoglobin Values for 2,205 Ru Children by Sex and by Age*

Ages	Girls			Boys		
	No. of Subjects	Hemoglobin, Gm.	Standard Error	No. of Subjects	Hemoglobin, Gm.	Stan dard Erro
6	185	10.09	1.88	172	10.00	2.07
7	153	10.44	2.20	171	10.29	1.91
8	170	10.58	1.86	197	10.58	2.00
9	143	10.44	1.93	113	10.44	2.18
10	84	10.44	1.97	99	10.73	2.29
11	80	10.73	1.63	81	10.58	2.11
12	75	10.87	1.88	82	9.86	1.84
13	61	11.02	1.88	49	10.73	1.95
14	54	11.16	1.69	55	11.02	1.86
15	25	10.58	1.56	44	11.16	1.78
16	37	10.73	1.73	24	11.02	2.42
17	13	11.74	2.22	12	11.45	2.07
18	14	10.87	1.73	12	10.87	2.50

normal, range, a little more than 35 per cent the subnormal range and the remaining subjec in the anemic range. It will be noted that 2 per cent of the group had hemoglobin valu of from 9 to 11.4 Gm., 13.3 per cent had valu which indicated a serious anemic condition an approximately 2 per cent had critical value The slight variations noted in the distributio according to sex appear to be due largely t errors in sampling. As to distribution accordin to age, the data show that a large percentag of the younger children were in the anemic rang With increasing age there was a shift towar higher values, until at about the age of puber and beyond approximately one third of th subjects were in each of the three groups.

From the Department of Home Economics, Florida Agricultural Experiment Station.

1. Abbott, O. D., and Ahmann, C. F.: Human Relationships, Soil Sc. Soc. Florida **2**:109, 1940.

The statistical significance of the slight variations in the mean hemoglobin values of these subjects was determined by Tallqvist's t test. From the results of this test it was found that only significant difference in the hemoglobin values for the girls appeared between the ages 16 and 17, and for the boys, between the ages 11 and 12 and 12 and 13. The differences in the means for both sexes at 6 years and at puberty were highly significant, while the fluctuations between the ages of 14 and 17 years were due to chance sampling and had no statistical significance. When the mean values for the girls were compared with those for the boys of corresponding ages, a significant difference appeared only at the age of 12 years. It is observed, however, that there was no more difference in the mean values for the two sexes when combined ages than in the records for the same sex for individual years.

In the analysis of the data in table 2 a chi-square test was made for each year for the number of subjects in the various hemoglobin ranges and also for the totals. This test showed that only at the age of 12 years was the difference in the percentage distribution of boys and girls significant; the values for the total sample did not differ. However, it was found that there was a significant difference in the distribution of the two age groups 6 to 12 years and 13 to 18 years in the normal as well as in the anemic range; in the subnormal range there was no difference.

COMMENT

Average hemoglobin values for children of different ages have been reported on by several investigators. Perhaps the most extensive and recent studies are those of Mack, Smith, Logan and O'Brien,[2] for Pennsylvania children; of Mugrage and Andresen,[3] for Colorado children, and of Osgood and Baker,[4] for Oregon children. While for both sexes and at every age the mean

TABLE 2.—*Percentage Distribution of Girls and Boys by Age According to Range of Hemoglobin Values*

		Normal		Subnormal		Anemic						
		Above 13.5 Gm.		11.4 to 13.6 Gm.		9 to 11.4 Gm.		6.1 to 9 Gm.		3.6 to 6.1 Gm.		
Age, Yr.	Sex	No. of Subjects	Per Cent of Total	No. of Subjects	Per Cent of Total	No. of Subjects	Per Cent of Total	No. of Subjects	Per Cent of Total	No. of Subjects	Per Cent of Total	Total Number
6	Girls	27	14.6	58	31.4	62	33.5	34	18.4	4	2.1	185
	Boys	31	18.0	52	30.3	44	25.5	37	21.5	8	4.7	172
7	Girls	32	20.9	54	35.3	39	25.5	25	16.3	3	2.0	153
	Boys	27	15.8	66	38.6	45	26.4	27	15.7	6	3.5	171
8	Girls	33	19.4	72	42.3	46	27.1	19	11.2	..	...	170
	Boys	40	20.3	77	39.1	54	27.4	21	10.6	5	2.6	197
9	Girls	30	21.0	53	37.1	41	28.7	18	12.5	1	0.8	143
	Boys	26	23.0	40	35.4	28	24.7	15	13.3	4	3.6	113
10	Girls	17	20.2	29	34.5	23	27.4	15	17.9	..	...	84
	Boys	32	32.3	27	27.3	24	24.2	14	14.2	2	2.0	99
11	Girls	16	20.0	37	46.3	19	23.7	8	10.0	..	...	80
	Boys	21	25.9	24	29.6	25	30.9	7	8.6	4	5.0	81
12	Girls	19	25.3	29	38.7	20	26.6	7	9.3	..	...	75
	Boys	9	11.0	28	34.1	27	32.9	15	18.3	3	3.7	82
13	Girls	20	32.8	18	29.5	18	29.5	5	8.2	..	...	61
	Boys	13	26.5	19	38.8	12	24.5	5	10.2	..	...	49
14	Girls	15	27.8	22	40.7	12	22.2	5	9.3	..	...	54
	Boys	17	30.9	20	36.4	14	25.5	4	7.2	..	...	55
15	Girls	5	20.0	12	48.0	5	20.0	3	12.0	..	...	25
	Boys	14	31.8	18	40.9	10	22.7	2	4.6	..	...	44
16	Girls	8	21.6	13	35.1	14	37.8	2	5.4	..	...	37
	Boys	9	37.5	9	37.5	3	12.5	1	4.2	2	8.3	24
17	Girls	8	61.5	..	....	2	15.4	3	23.1	..	...	13
	Boys	5	41.7	4	33.3	2	16.6	1	8.3	..	...	12
18	Girls	4	28.6	5	35.7	4	28.6	1	7.1	..	...	14
	Boys	4	33.3	4	33.3	3	24.9	..	...	1	8.4	12
Total	Girls	234	21.4	402	36.7	305	27.8	145	13.3	8	0.73	1,094
	Boys	248	22.3	388	34.9	291	26.2	149	13.4	35	3.15	1,111
	Both sexes	482	21.9	790	35.8	596	27.0	294	13.3	43	1.96	2,205

2. Mack, P. B.; Smith, J. M.; Logan, C. H., and O'Brien, A. T.: Hemoglobin Values in Pennsylvania: Mass Studies in Human Nutrition, Milbank Mem. Fund Quart. **19**:282, 1941.

3. Mugrage, E. R., and Andresen, M. I.: Red Blood Cell Values in Adolescence, Am. J. Dis. Child. **56**: 997 (Nov.) 1938.

4. Osgood, E. E., and Baker, R. L.: Erythrocytes, Hemoglobin, Cell Volume and Color, Volume and Saturation Index Standards for Normal Children of School Age, Am. J. Dis. Child. **50**:343 (Aug.) 1935.

values for Florida children included in this study are low as compared with the values in the literature just cited, they are in agreement with values reported previously for Florida children.[5]

According to Wintrobe and Miller,[6] the opinion that red cell counts, and particularly hemoglobin values, are low in the South has been expressed often. However, Wintrobe [7] and Wintrobe and Miller,[8] after studying healthy young men and women living in a subtropical climate, concluded that the average values for the men were practically the same as elsewhere and that those for the women were not significantly different from values recorded in other parts of the world. Moreover, the finding that more than one fifth of the subjects in this and in previous studies had hemoglobin concentrations in the highest range shows that normal hemoglobin values are possible in this climate and in this section of the state.

In 1939 Abbott and Ahmann [8] reported the results of a study of the causes of the low hemoglobin values of Florida children. They observed that the administration of iron and ammonium citrates to anemic children resulted in rapid regeneration of hemoglobin. From this and from studies now in progress the conclusion has been reached that the low concentration of hemoglobin in rural children in several sections of the state is due for the most part to dietary deficiencies, of which lack of iron is the primary one.

While many investigators have reported considerable variation in hemoglobin values for males and for females, which has been attributed to differences in sex and age, in this study only slight variations were noted. It is generally agreed that variations in hemoglobin due to sex are, up to the age of puberty, hardly greater than the experimental error and may for all practical purposes be disregarded. The data on Florida children are in conformity with this statement.

It is generally accepted that after puberty there is a gradual increase in hemoglobin in both sexes until adult levels are reached. It appears that boys reach the normal adult level, of 15.8 Gm., at about the age of 17, while girls r their adult level, of 13.8 Gm., several y earlier.[9] On this point the data on the Flo children are not in agreement. There were significant differences in the values for the b and the girls at puberty or during adolesce and while there was a significant increase in mean hemoglobin levels for both sexes at age of 14, the average values for neither reached normal adult levels. In the Flo group the only significant difference in the he globin concentration of girls and of boys peared at the age of 12 years. At this age mean value for the boys was significantly lo than that for the girls. Since no referenc a decrease in hemoglobin values at 12 years been noted in the literature, the observed crease in the values for Florida boys has b attributed to a local condition, as yet unde mined.

Throughout this study it was noted that younger children tended to have lower he globin values than the older ones. This especially noticeable for values in the ane range. There is, however, some question a whether this variation was due entirely to Such factors as differences in size of sam in general health and in diet would undoubt affect these values. The effect of these fac on the hemoglobin level will be discussed i later paper. However, it may be said in connection that while many investigators have reported considerable variation in he globin have attributed this variation entirely differences in age and sex, of late there is s basis for the opinion that these variations ma due largely to differences in diet. Through the nutritional studies which we have car on for the past fifteen years it has often b observed that a well nourished child maint a high hemoglobin level from childhood maturity. There are no increases at puberty during adolescence, while the differences the values for the males and for the females negligible.

In their study of hemoglobin values M and her co-workers [2] said, "There are ind tions that the age and sex differences found this study which confirm the results of previ investigators may be the result of dietary well as physiologic differences." It appears, t that there is a possibility that the hemoglo picture usually presented is the average and necessarily the normal or optimum one.

5. Abbott, O. D., and Ahmann, C. F.: Iron Deficiency Anemia in Children, Am. J. Dis. Child. **58**:811 (Oct.) 1939; footnote 1.

6. Wintrobe, M. M., and Miller, M. W.: Normal Blood Determinations in the South, Arch. Int. Med. **43**:96 (Jan.) 1929.

7. Wintrobe, M. M.: Blood of Normal Young Women Residing in a Subtropical Climate, Arch. Int. Med. **45**:287 (Feb.) 1930.

8. Abbott, O. D., and Ahmann, C. F.: Iron Deficiency Anemia in Children, Am. J. Dis. Child. **58**:811 (Oct.) 1939.

9. Wintrobe and Miller.[6] Wintrobe.[7]

SUMMARY

The mean hemoglobin values of 2,205 rural white children 6 to 18 years of age living in 5 counties in Florida were studied.

The only significant difference between the hemoglobin levels of boys and of girls was at the age of 12 years. At this age the value for the boys was lower than that for the girls.

In both sexes there was a small but significant increase in hemoglobin values from the age of 13 years until puberty.

The fluctuations in hemoglobin levels observed during adolescence had no statistical significance and were attributed to chance sampling.

At the age of 17 the mean values for males and for females were 11.45 and 11.74 Gm. per hundred cubic centimeters respectively.

The data show that 42.3 per cent of the subjects had hemoglobin values in the lowest range (3.6 to 11.4 Gm.).

The low hemoglobin values for Florida children are probably due to dietary deficiencies, of which lack of iron is the primary one.

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INTESTINAL POLYPARASITISM

CLINICAL SURVEY OF ONE HUNDRED AND SIXTY-ONE CASES OF INFECTION WITH MULTIPLE INTESTINAL PARASITES IN CHILDREN

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In Panama one encounters the medical problems met with in temperate zones, although there are noticeable differences in the frequency of their occurrence due chiefly to variations in climatic conditions, mode of living and degree of development of sanitation. These differences are evident in the treatment of children; one cannot practice pediatrics in Panama without being impressed by the frequency of infection with intestinal parasites. Such infection is so widely prevalent that instead of being a matter of minor medical importance, as it is in most parts of the United States, it is a matter of prime clinical significance.

Many excellent contributions to the knowledge of helminthiasis have appeared in the literature, but only a few of them have dealt with this condition in children. Existing misconceptions concerning the incidence, clinical manifestations and treatment of intestinal parasitism in children prompted the present survey.

From the Pediatric Service, Gorgas Hospital, Ancon, Canal Zone.

SOURCE OF MATERIAL

This study was one of five surveys based on vestigations on 518 patients infected with in tinal parasites and admitted to the pediatric wa of Gorgas Hospital, Ancon, Canal Zone, betw Jan. 1, 1941 and Jan. 1, 1944. These pati were divided into two groups as follows: grou consisting of 357 patients in whom infection produced by a single parasite, and group 2, c sisting of 161 in whom infection was produced two or more parasites. Group 1 has been repor on in separate communications dealing w oxyuriasis,[1] ascariasis,[2] trichuriasis,[3] ancylo

TABLE 1.—*Distribution of Intestinal Parasites in Children in a Large General Hospital Located on the Isthmus of Panama*

Infection	Number of Patients	White		Negro		Mestizo	
		No.	%	No.	%	No.	%
Ascariasis	125	7	5.6	46	36.8	72	57
Oxyuriasis	100	70	70	9	9	21	21
Ancylostomiasis	71	4	5.6	33	46.4	34	48
Trichuriasis	50	3	6	31	62	16	32
Strongyloidiasis	11	1	9	8	73	2	18
Ascariasis and trichuriasis	42	1	2.4	11	26.2	30	71
Ascariasis and ancylostomiasis	34	0	0	1	2.9	33	97
Ascariasis, ancylostomiasis and trichuriasis	22	0	0	2	9	20	91
Ascariasis, ancylostomiasis, strongyloidiasis and trichuriasis	9	0	0	1	11.1	8	88
Ascariasis and oxyuriasis	6	1	16.7	1	16.7	4	66
Ascariasis, ancylostomiasis and strongyloidiasis	3	0	0	1	33	2	67
Ascariasis and strongyloidiasis	2	0	0	0	0	2	100
Ascariasis, oxyuriasis and trichuriasis	2	0	0	0	0	2	100
Ascariasis, strongyloidiasis and trichuriasis	2	0	0	0	0	2	100
Ancylostomiasis and trichuriasis	16	0	0	5	31.3	11	68
Ancylostomiasis and strongyloidiasis	9	0	0	2	22	7	78
Ancylostomiasis, strongyloidiasis and trichuriasis	7	0	0	3	42.8	4	57
Ancylostomiasis and oxyuriasis	3	0	0	1	33.3	2	66
Ancylostomiasis, oxyuriasis and trichuriasis	1	0	0	0	0	1	100
Oxyuriasis and trichuriasis	2	0	0	0	0	2	100
Oxyuriasis and strongyloidiasis	1	0	0	1	100	0	0
Total	518	87	16.8	156	30.1	275	53

1. Miller, J. F.; Einhorn, N. H., and Whittier, Oxyuriasis: A Clinical Survey of Two Hundred C secutive Cases of Infection with Enterobius Vermicu in Children, Am. J. Dis. Child. **68**:376-381 (Dec.)

2. Einhorn, N. H.; Miller, J. F., and Whittier, Ascariasis: Clinical Survey of One Hundred Twenty-Five Cases of Infection with Ascaris Lum coides in Children, Am. J. Dis. Child. **69**:23 (April) 1945.

3. Whittier, L.; Einhorn, N. H., and Miller, J. Trichuriasis in Children: A Clinical Survey of Cases and Reports of Three Cases with Heavy Infec and Striking Clinical Symptoms, Am. J. Dis. C to be published.

sis and strongyloidiasis.[4] This presentation imited to a consideration of the second group, tributed as indicated in table 1.

n the Canal Zone, there exists a system of te medicine among government employees and ir families; therefore, no socioeconomic selec- n of patients was made in this series, and all ups were represented. Racially, the patients re classified as white, Negro and mestizo.

TABLE 2.—*Age Incidence in 161 Cases of Intestinal Polyparasitism in Children*

Age, Years	Number of Patients
9/12	1
1	2
1 9/12	3
2	22
3	12
4	20
5	19
6	19
7	13
8	8
9	12
10	9
11	10
12	11

CLINICAL CONSIDERATIONS

Location of Dwellings.—Living conditions on Isthmus of Panama were separated into three s as follows:

. United States government communities lo- d in the Canal Zone, characterized by minimal wding, excellent toilet and sewage disposal lities, paved streets and landscaped yards.

. Principal cities of the Republic of Panama, he center of which overcrowding among the r is commonplace, sewage disposal is ade- te, although not used to the fullest extent an uninformed populace, and streets and ys are paved. In the outskirts of these cities, age disposal facilities are minimal, the streets unpaved and landscaping is absent.

. Rural or semirural communities in the Canal e or Republic of Panama (interior), where ulation is sparse, living conditions primitive sanitation absent, even outhouses being seen equently.

n order to determine what relationship the tion of dwellings had to polyparasitism, the ilable data in this series of 161 patients were yzed. It was found that 116, or 72.1 per cent, d on farms or in rural communities in the Canal Zone or in the interior of the Republic of Panama. Twelve, or 6.8 per cent, came from United States government communities in the Canal Zone, and 34, or 21.1 per cent, came from large cities in the Republic of Panama.

Age.—The age distribution is shown in table 2. The youngest child was 9 months old and lived in an unsanitated rural area. He was infected with Ascaris lumbricoides and Trichuris trichiura. Mixed infections were uncommon before the age of 2 years. The incidence then increased rapidly until the age of 5, when 79, or approximately one half of the children, had accumulated their burden of worms.

Sex.—One hundred and three, or 64 per cent, were boys and 58, or 36 per cent, girls.

Race.—Striking differences in racial distribution were observed. Reference to table 1 shows that 130 (80.8 per cent) were mestizo, 29 (18 per cent) Negro and 2 (1.2 per cent) white.

SYMPTOMATOLOGY OF POLYPARASITISM

One hundred and nineteen children in this study (74 per cent) were brought to the hospital with conditions other than parasitism and 42 (26 per cent) with symptoms later accounted for by the parasitic infection alone. Of the unrelated associated diseases encountered, malaria and miscellaneous conditions of the respiratory tract were most frequent, with a total of 61 patients (37.9 per cent) and 34 (21.1 per cent), respectively.

TABLE 3.—*Associated Unrelated Diseases in 161 Children with Intestinal Polyparasitism*

Disease		Number of Patients
Estivoautumnal malaria		38
Tertian malaria		23
Diseases of the respiratory tract		34
Rhinopharyngitis	19	
Lobar pneumonia	6	
Asthma	4	
Bronchopneumonia	3	
Cystic disease of lung	1	
Pulmonary tuberculosis	1	
Acute communicable disease		10
Rheumatic fever and heart disease		4
Acute glomerulonephritis		2
Miscellaneous		8
Total		119
Intestinal parasitism unassociated		42

Because of the frequency of associated unrelated diseases (table 3), it was difficult to classify the symptoms accurately and to state that they were due either to parasitism or to associated unrelated disease. In many instances, the symptoms could have been due to either one or both. It seemed advisable to divide symptoms into three classes as follows: (1) those presumably due to

. Miller, J. F.; Einhorn, N. H., and Whittier, L.: ylostomiasis and Strongyloidiasis: A Clinical Sur- of Seventy-One Cases of Ancylostomiasis and en Cases of Strongyloidiasis in Children, Am. J. Child. **69**:359-365 (June) 1945.

parasites; (2) those due to either parasites or associated unrelated disease, and (3) those due to associated unrelated disease. Symptoms which could not be explained by the unrelated disease were listed under parasitism. The third group, which included such symptoms as chills and fever, headache, sweats, somatic pains, delirium, rhinorrhea, purulent aural discharge, cutaneous rash and sore throat, was discarded. It was not possible to eliminate the second group, attributable to either parasitism or associated unrelated disease, without introducing the possibility of discarding important findings. In order to avoid missing any, the symptoms in the first and second groups were combined (table 4).

is possible that there were masked causes the fevers observed. If such was the case, were not discovered.

Diarrhea was present in 25 patients (15.5 cent). Associated disease was present in on of these children. There were several childre years of age or younger in whom the diarr was associated with severe dehydration, los weight and loss of tissue elasticity, resemb the picture seen in acute intestinal intoxicat In the main, however, the diarrhea of intest parasitism extended over a period of sev weeks to several months, as occurred in 5 of cases. The stools numbered four to six d and were loose but usually not watery. This t

TABLE 4.—*Frequency of Symptoms Due to (1) Intestinal Polyparasitism Alone and (2) to Either Polyparasitism or Associated Unrelated Disease*

In order to reduce to a minimum the possibility of discarding important observations, the two groups have combined to obtain the maximum frequency of symptoms in intestinal polyparasitism.

Symptoms	Number Due to Polyparasitism Alone	Per Cent	Number Due to Either Polyparasitism or Associated Unrelated Disease	Total	Per Ce
Vomiting	19	11.8	3	32	19.9
Vomiting worms	5	3.1	0	..	....
Worms by mouth and bowel	5	3.1	0	..	....
Fever	27	17.0	4	31	19.3
Diarrhea	16	10.0	2	25	15.5
Bloody diarrhea	7	4.3	..	..	....
Anorexia	19	11.8	5	24	14.9
Passing worms by bowel	16	10.0	0	21	13.0
Worms by mouth and bowel	5	3.1	0	..	....
Abdominal pain	17	10.6	4	21	13.0
Cough	13	8.0	8	21	13.0
Drowsiness, listlessness	7	4.3	0	7	4.3
Dyspnea	0	0.6	4	4	2.5
Prolapse of rectal mucosa	4	2.5	0	4	2.5
Tenesmus	4	1.9	0	4	2.5
Loss of weight	3	1.9	0	3	1.9
Convulsions	0	0	3	3	1.9
Headache	1	0.6	2	3	1.9
Pruritus ani	1	0.6	0	1	0.6
Failing health	1	0.6	0	1	0.6
Constipation	1	0.6	0	1	0.6

In this study, vomiting and fever were the two most frequent symptoms. The former occurred in 32 patients (19.9 per cent), 29 of whom were brought to the hospital for unrelated disease. Five of these vomited worms (Ascaris lumbricoides), and an additional 5 vomited worms and passed them by bowel as well. Fever was observed in 31 patients (19.3 per cent), 23 of whom had no disease other than intestinal parasitism. The temperature ranged from 100 to 103 F. and usually returned to normal within a few days following the administration of a vermifuge. When hyperpyrexia was present in a child infected with Ascaris lumbricoides, abdominal pain, passing of worms by rectum and vomiting of worms were likely to occur. These symptoms were thought to be due to the increased movements of the ascarides in the presence of fever. It

of diarrhea did not respond readily to reduc or withholding of food. Gratifying respon followed the use of anthelmintics. Five c children who had a grossly blood-streaked d rhea were infected with Trichuris trichiura an other parasites. The frequency of this sympt in trichuriasis has been stressed in another co munication.[3]

Anorexia was noted in 24 patients (14.9 cent). The passing of worms by bowel recorded for 21 patients, 5 of whom vomi worms as well as passed them by bowel. dominal pain occurred in 21, or 13 per c This pain was vague in character and was haps more often of the nature of abdominal tress rather than actual pain. Cough was obser as frequently as pain, occurring in 21, or 13

of the patients. An analysis of the total den of worms carried by the children who ghed showed that 20 had ascariasis, 13 trich- sis, 9 ancylostomiasis, 4 strongyloidiasis and xyuriasis. Thus, although perhaps this was y a coincidental observation, 95 per cent of patients who presented cough as a symptom e infected with Ascaris lumbricoides. Ex- ive of the 9 patients with pneumonia, physical mination and roentgenographic studies of the sts of the children revealed no abnormal states. olapse of the rectum was observed in 4 chil- n in whom the predominating infection was huriasis. All 4 of these patients had a blood- aked diarrhea, and for 2 the parents reported icing small white worms on the surface of the lapsed mucosa. Prolapse was not seen in any ient with diarrhea in whose stools ova of churis trichiura were not found. Convulsions e seen in 3 children under the age of 3 years. e had an acute suppurative otitis media; the aining 2 had estivoautumnal malaria. All hem were admitted to the hospital with tem- atures ranging from 102 to 106.4 F. In such umstances, it was not possible to determine clusively whether the convulsions were caused intestinal parasites or by associated unrelated ase. Available evidence certainly favored the r origin.

Underweight was commonly observed, although amount and the frequency could not be de- mined with accuracy because routine determi- ions of heights and other measurements were obtained. Physicians making initial exami- ions recorded that 63 patients, or 39.1 per t. were poorly nourished, 54, or 33.5 per cent, ly well nourished and 44, or 27.3 per cent, l nourished. Poor nutrition was much more uent among boys than among girls, the ratio g 2.7 to 1. The significance of this observa- could not be determined. Of the 63 who e poorly nourished, 34 had malaria, which ld have contributed to the underweight, but 19 ered from no disease other than intestinal parasitism. An analysis of the total burden of ms carried by these 63 malnourished children wed that 48 had ascariasis, 42 ancylostomiasis, richuriasis, 10 strongyloidiasis and 6 oxyuri- . Of the 42 who had ancylostomiasis, 28 were infected with ascariasis. It was not possible estimate the per cent of underweight or to with finality that one parasite or combination arasites was more responsible for the produc- of underweight than another. It was felt, ever, that Ascaris lumbricoides was the most ly offender in this respect. The deleterious effect of intestinal parasitism on nutrition can be observed readily in the accompanying tabulation:

Number of Patients	Age in Years	Weight in Pounds
1	2	17
1	3	22
1	4	21
2	5	29
3	5	30
1	7	32

These are only a few of the more striking instances of underweight encountered in patients who had no associated unrelated diseases.

LABORATORY CONSIDERATIONS

Hemoglobin.—Estimations made by the Tallqvist technic were available for the entire group. When the hemoglobin level was found to be below 50 per cent, the result was checked by the Sahli method. The average percentage of hemoglobin in the entire group of 161 patients was 62 (table 5), as compared with 58 in the group of 42 children for whom only intestinal parasitism was diagnosed. Sixty patients (37.3 per cent) had hemoglobin values of 60 per cent or less. In a comparative group consisting of 30 children admitted to the surgical service with simple uncomplicated fractures and free from medical disease, 5, or 16.7 per cent, had values below 60. Of the 60 patients with low hemoglobin values, 20 had malaria, 19 infections of the respiratory tract, 4 acute communicable disease, 2 rheumatic heart disease and 1 acute glomerulonephritis. The remaining 14 had nothing but intestinal parasitism. It was not possible to determine what parasite or combination of parasites was responsible for anemia. However, analysis of the total burdens of worms carried by these patients showed that 39 had ancylostomiasis, 30 trichuriasis, 27 ascariasis, 10 strongyloidiasis and 4 oxyuriasis. Hemoglobin values between 20 and 25 per cent were noted in 3 children, all of whom had ancylostomiasis and 2 of whom also harbored Ascaris lumbricoides, Strongyloides stercoralis and Trichuris trichiura. No associated disease was present in these 3 patients.

TABLE 5.—*Summary of Hemoglobin Determinations and Erythrocyte, Leukocyte and Differential Counts in 161 Cases of Intestinal Polyparasitism*

	Hemoglobin, %	Erythrocytes, Millions	Leukocytes, %	Neutrophils, %	Lymphocytes, %	Eosinophils, %
High	75	5.0	31.7	88	86	28
Low	20	1.3	3.0	12	12	0
Median	65	3.8	7.8	62	34	2
Average	62	3.6	9.5	62	35	3.2

Erythrocyte Counts.—The patients with erythrocyte counts below 3,200,000 were essentially the same 60 who showed reduced hemoglobin values. The lowest counts recorded for 3 patients were 1,300,000, 1,500,000 and 1,600,000. The average erythrocyte count for those in whom only intestinal parasitism was diagnosed was 3,100,000 (table 5).

Leukocyte Counts.—Although the total number of leukocytes varied from 3,000 to 31,700, the average was 9,500 and the median 7,800 (table 5). The average observed in 42 patients with uncomplicated intestinal parasitism was 8,700. When counts deviating from normal were noted, they were mainly those caused by unrelated associated diseases.

Differential Leukocyte Counts.—Neutrophils varied from 12 to 88 per cent, with a median of 62 per cent. Lymphocytes and monocytes combined varied from 12 to 88 per cent, with a median of 34 per cent (table 5). The number of basophils was insignificant. Special consideration was given to eosinophils, since an increase in number has been considered to be a valuable aid in the diagnosis of intestinal parasitism. In table 6 are given the counts observed in this study.

TABLE 6.—*Eosinophilic Counts in 161 Cases of Intestinal Polyparasitism*

Eosinophils, per Cent	Patients	
	Number	Per Cent
0	48	29.8
1	17	10.6
2	32	19.9
3	22	13.7
4	12	7.5
5	2	1.2
6	6	3.7
7	4	2.5
8	3	1.9
9	1	0.6
10	3	1.9
11	1	0.6
12	3	1.9
15	2	1.2
18	4	2.5
28	1	0.6

Todd and Sanford [5] have stated that the maximum normal number of eosinophils is 4 per cent. By this standard, 30, or 18.6 per cent, of the patients had eosinophilia and 131, or 81.4 per cent, did not. Of 42 for whom intestinal parasitism alone was diagnosed, 14 had eosinophilia.

Stool Examinations.—Ova of more than one intestinal parasite were observed in the stools of all the patients studied. Oxyuriasis was diagnosed by means of the cellophane tip. O a few stools were tested chemically for blo The results of the guaiac test were found po tive for 12 patients, and microscopic examinat revealed the presence of blood in the stools an additional 9, making a total of 21 in wh stools blood was demonstrated. Of the patients in whose stools gross, chemical microscopic examination revealed blood, 11 h trichuriasis, 5 strongyloidiasis, 4 ancylostomia and 3 ascariasis.

TREATMENT

The vermifuges used in treatment consisted the following: hexylresorcinol, tetrachloroeth ene, oil of chenopodium, gentian violet medicin and *Leche de higueron* (latex of the wild fig t Ficus laurifolia). Technics for the administ tion of most of these agents have been discuss in other communications.

Hexylresorcinol was given to 122 patie From one to five treatments administered intervals of from five to seven days were nec sary. This vermifuge was observed to be m effective in the treatment of ascariasis and mod ately effective in the treatment of ancylostomia Its effect on strongyloidiasis and trichuria seemed to be in the nature of a reduction number of parasites rather than of a compl elimination. The efficacy of this drug in treatment of the latter parasitic infections seem to be enhanced by the additional use of 1:1,0 solution of hexylresorcinol as retention enem and/or one or more courses of enteric-coated t lets of gentian violet medicinal. Hexylresorci followed in several days by tetrachloroethyl was most effective in the treatment of the co bination of ascariasis and ancylostomiasis. administration initially of tetrachloroethylene children with such infections caused the ascari to become overactive, with resultant abdomi pain. In order to eliminate this, hexylresorci was given first and followed in a few days w tetrachloroethylene when necessary.

Tetrachloroethylene was most effective in treatment of ancylostomiasis but was relativ ineffective against ascariasis, strongyloidia trichuriasis and oxyuriasis. Occasionally, ho ever, the larvae of Strongyloides stercoralis appeared from stools after intensive therapy w hexylresorcinol and tetrachloroethylene. Of 161 children studied, 104 had ancylostomia of whom 87 were treated with from one to courses of hexylresorcinol. The stools of of 71 patients examined became negative. Sev teen patients were treated with one or m courses of tetrachloroethylene alone, and ne tive stools were recorded for 12. Of the

5. Todd, J. C., and Sanford, A. H.: Clinical Diagnosis by Laboratory Methods, ed. 10, Philadelphia, W. B. Saunders Company, 1943, pp. 278-279.

dren who had ova in the stools after treatnt with hexylresorcinol, 11 were treated subiently with tetrachloroethylene and negative ols were recorded for 8.

Oil of chenopodium was administered to 9 ients with ascariasis and ancylostomiasis, but ow-up examinations of the stool revealed that se of 5 were positive for both parasites, essitating the use of other drugs.

Gentian violet medicinal in the form of entericted tablets was relatively effective in the treatnt of oxyuriasis, and when preceded with one more courses of hexylresorcinol it was found have a slight value in the treatment of ngyloidiasis. Anorexia, abdominal cramps, sea and vomiting occurred frequently when ge doses were given (1 grain [0.06 Gm.] ee times daily).

The most disappointing of all the vermifuges d was *Leche de higueron*. Both the fresh ex from the wild fig tree, Ficus laurifolia, ich grows locally, and the Colombian proetary preparation *Higueronia* were tried, and h were equally ineffective in the treatment of churiasis and oxyuriasis. The success which ust [6] has had with this drug in the treatment trichuriasis has encouraged further trial.

Treatment consisted of two important parts: t, that directed at the parasitic infection and, ond, that directed at the general condition of individual child. Anthelmintic therapy has eady been described. These children were en balanced diets adequate in calories and amins as soon as the tolerance of the gastroestinal tract permitted. Iron was administed when a mild anemia was present. Blood nsfusions were necessary for several patients h severe anemia. Following such therapy, was surprising to see how quickly many of children gained in weight and vigor.

REPORT OF CASES

In observing patients infected with intestinal rasites, it was noted that they could be divided ghly into two groups: those who showed both ious symptoms and/or signs of infection, and se who showed either minimum or comte absence of symptoms and signs. Although symptoms and signs observed could not be lyzed in a simple manner, a strong resemnce to those seen in a child with a single rasite [7] often made possible the identification the dominant parasite. The case records of patients all of whom had the combination of ascariasis, ancylostomiasis, trichuriasis and oxyuriasis have been selected to illustrate this point. Although the stools of each of these children showed the presence of the ova of Ascaris lumbricoides, Necator americanus, Trichuris trichiura and the larvae of Strongyloides stercoralis, a striking difference in presenting symptoms and physical signs was apparent for each child. This difference seemed to be due to the fact that in each instance one parasite was predominant and responsible for the clinical picture.

CASE 1.—A 9 year old mestizo boy from an unsanitary rural district of the Canal Zone was admitted with complaints of weakness of six weeks' duration, fever, vomiting, anorexia, cramplike abdominal pain and the passing of large worms in the stools for two days prior to admission. Physical examination revealed a moderately well developed and well nourished boy, not acutely ill, weighing 51 pounds (23.1 Kg.) and having a temperature of 101 F.

Results of laboratory examinations were as follows: hemoglobin content, 70 per cent; erythrocytes, 4,500,000, and leukocytes, 8,500, with neutrophils 78 per cent, eosinophils 2 per cent and lymphocytes 20 per cent; repeated blood smears for malaria, negative. The urine was normal, and cultures of the stools were sterile. Kahn and tuberculin tests elicited negative reactions. Treatment consisted of three courses of hexylresorcinol, the last of which was followed by a retention enema of 1:1,000 solution of hexylresorcinol. A total of 112 ascarides were counted in the stools passed by this patient. The child gained 4 pounds (1.8 Kg.) during a three weeks stay in the hospital. Three successive stools examined before discharge were found to be positive for ova of Trichuris trichiura. In this child, the symptoms and signs were those of severe ascariasis.

CASE 2.—A 9 year old mestizo girl residing in an unsanitary rural district of the Canal Zone was admitted to the hospital with complaints of listlessness, loss of interest in play, fever, anorexia and inability to sleep, for two weeks. Physical examination revealed a dull, listless, poorly nourished girl having a temperature of 100.6 F. and weighing 45 pounds (20.4 Kg.). There was noticeable pallor of the mucous membranes; the palms and the soles were waxen in appearance, and the abdomen was moderately distended.

Results of laboratory examinations were as follows: hemoglobin content, 22 per cent (Sahli); erythrocytes, 1,500,000; leukocytes, 7,700, with neutrophils 74 per cent, lymphocytes 24 per cent and eosinophils 2 per cent. Repeated thick and thin blood smears for malaria were negative. The urine was normal. Kahn and tuberculin tests elicited negative reactions, and repeated cultures of the stools were sterile.

The patient was given a transfusion of 125 cc. of citrated blood. As soon as the vomiting ceased, a diet high in calories with added vitamins and iron was given. Anthelmintic therapy consisted of two courses of hexylresorcinol followed by a single course of tetrachloroethylene. Improvement after the second course of hexylresorcinol was rapid, although examination of the stools still revealed the presence of all the parasites except Ascaris lumbricoides. After treatment with tetrachloroethylene, ova of Trichuris trichiura and larvae of Strongyloides stercolaris were found. During the month this child was hospitalized, she gained 4 pounds (1.8 Kg.) in weight, her activity and interest improved and the hemoglobin level and erythrocyte count increased

6. Faust, E. C.: Personal communication to one of authors (J. F. M.).
7. Footnotes 1, 2, 3 and 4.

to 62 per cent (Sahli) and 3,200,000, respectively. Clinically this was a case of hookworm predominance.

CASE 3.—A 9 year old mestizo boy, residing in an unsanitary rural district of the Canal Zone, was admitted with a history of four to six blood-streaked stools daily for three weeks, weakness, anorexia, vomiting and fever of two days' duration. Physical examination revealed a fairly well developed and nourished child weighing 62 pounds (28.1 Kg.), with a temperature of 100.6 F. and a moderate degree of prolapse of the rectum. Closer examination disclosed that the prolapsed mucosa was covered with several hemorrhagic areas about 4 to 6 mm. in diameter. Several parasites identified as Trichuris trichiura were seen moving about on the prolapsed tissue.

Results of laboratory examinations were as follows: hemoglobin content, 60 per cent; erythrocytes, 3,400,000, and leukocytes, 12,500, with neutrophils 65 per cent, lymphocytes 20 per cent and eosoniphils 15 per cent. Blood smears for malaria were negative; the urine was normal; Kahn and tuberculin tests elicited negative reactions, and cultures of the stools and search for amebas did not reveal the presence of parasites.

During the first twenty-four hours the child had six semiliquid stools, all of which contained small streaks of bright red blood. The act of defecation was painful. At each stool, the rectum prolapsed at least 1 cm. and from 3 to 8 whipworms could be seen on the exposed tissue. There was no vomiting at any time while the boy was in the hospital. Treatment consisted of three courses of hexylresorcinol at five day intervals. Shortly after the second course, the prolapse disappeared, the number of stools decreased to one or two daily and gross blood was no longer visible. Chemical and microscopic examinations of the stools failed to reveal the presence of blood. Ova of Trichuris trichiura and larvae of Strongyloides stercoralis were still present, however. The third course of treatment was followed by a retention enema of a 1:1,000 solution of hexylresorcinol. Although this patient gained 2 pounds (0.9 Kg.) and was free of symptoms when discharged from the hospital, ova of Trichuris trichiura and larvae of Strongyloides stercoralis were still observed in the stools. In this case the symptoms and physical signs were associated with a predominance of Trichuris trichiura.

CASE 4.—A 16 month old Negro boy residing in the outskirts of one of the large cities of the Republic of Panama was admitted to the hospital with a history of fever, cough, vomiting, diarrhea and pain, apparently abdominal, of two days' duration. The child had been breast fed for ten months, and afterward had been given a powdered milk formula with added carbohydrate. The only other foods in his diet were boiled rice, orange juice and a cod liver oil concentrate. Development had been normal. He had had loose stools intermittently for three months. Physical examination revealed a listless, well developed and well nourished infant weighing 22 pounds (10 Kg.) and having a temperature of 104 F. There was no evidence of rickets. Aside from suggestive nuchal rigidity, noticeable distention of the abdomen and moderate excoriation of the buttocks, there were no grossly abnormal findings.

Results of laboratory examinations were as follows: hemoglobin content, 70 per cent; erythrocytes, 3,600,000, and leukocytes, 19,400, with neutrophils 79 per cent, lymphocytes 18 per cent and eosinophils 3 per cent. Repeated thick and thin blood smears were negative for malaria. Examination of the spinal fluid and urine, Kahn and tuberculin tests, a roentgenogram of the chest and repeated search for amebas in the stools and cultures of the blood and stools revealed no abnormalities. The guaiac test for blood in the stool elicited a positive reaction.

The temperature fluctuated between 99 and 105 F. seven days. Although no definite cause could be fo the presence of a cough suggested that there were p sites in the lungs. No abnormal physical signs w observed in the chest. Repeated roentgenograms of lungs showed no abnormality. The diarrhea, wh persisted after the return of the temperature to nor was treated by simple feedings of reduced caloric va and fluids parenterally as indicated. Eight days a the patient's admission, anthelmintic therapy started. Hexylresorcinol was administered twice five day intervals followed in a week by tetrachl ethylene. Diarrhea ceased after the first treatm While the patient was in the hospital, the hemogl level dropped to 45 per cent and the erythrocytes 2,700,000. As soon as the tolerance of the gastroin tinal tract for food returned to normal, a diet high calories with added vitamins and iron was given. W out other therapy, the hemoglobin level and the eryth cyte count rose to 60 per cent and 3,400,000, res tively. When discharged from the hospital, two mo after admission, this child still harbored Strongylo stercoralis and Trichuris trichiura. In this case symptoms and physical signs were associated wit predominance of Strongyloides stercoralis.

COMMENT

Intestinal parasites were found in surrou ings in which personal hygiene, living and vironmental conditions were at a low level combined to favor embryonation of ova in polluted soil. That 34, or 21.1 per cent the patients, came from larger cities in the public of Panama seemed contrary to expec tions. Similarly disconcerting figures w found in the studies of unmixed parasitic in tions: in ascariasis, 26.4 per cent [2]; in ancy tomiasis, 17 per cent,[3] and in trichuriasis, per cent.[4] Obviously these figures are misle ing, because such infections should be uncomm in the city, with sanitation facilities. Investi tion revealed that many of these children quired their infections in rural districts and w brought into the cities later by parents emplo by agencies of the United States governm If the figures just mentioned were correspo ingly adjusted, the number who lived in sanita cities would be reduced and the number fr rural districts would be increased accordin

A few of the mestizos and all the white patie lived in surroundings in which sanitation, hygi and environmental factors were most satisf tory. Many of the Negroes lived in places which these were only fairly satisfactory. M of the mestizos and some of the Negroes actu lived on the soil. It was not surprising, the fore, to find the highest incidence of intesti parasitism in the mestizos and the lowest white children. There were 2 white patie 1 of whom had returned from an extended va tion in the interior of the Republic of Pana with acute primary tertian malaria, ascari and strongyloidiasis.

The symptoms and clinical signs observed re: (1) those produced by migrating larvae (2) those produced by adult worms. In ily infected children, it seemed plausible that a few were being reinfected by constant or eated exposure, so that combinations of the groups of symptoms were seen. There were, example, 9 patients with pneumonia, all of om had ascariasis. Two of each of these ed ascarides in their stools. There was no dence, however, that any instances of pneu- ia were due to larval forms in the lungs or e of the atypical lobular type called ascaris umonitis by Keller, Casparis and Leathers.[8] er and cough were among the more common ptoms encountered. Except for the instances pneumonia mentioned previously, abnormal sical signs in the chest were observed infre- ntly, and roentgenologic examination of the gs of 14 additional patients revealed essen- ly normal conditions. The sputums of 9 ients were examined for larvae, but none were erved. Only 1 child included in this series d. The anatomic cause of death was con- ital cystic pulmonary disease, polyparasitism g a coincidental observation.

The symptoms produced by adult worms have n placed in four groups as follows: (1) gen- l symptoms; (2) symptoms arising from sitivity to absorbed foreign proteins; (3) vous symptoms, and (4) gastrointestinal ptoms. In the majority of the patients died, polyparasitism either caused no serious ptoms or was productive of symptoms which ents ignored or dismissed as being unim- tant.

Such general symptoms as pallor, circles under eyes, poor development and nutrition, mental physical sluggishness, anemia and eosino- lia have been attributed to intestinal parasites. llor, circles under the eyes or poor develop- nt was not mentioned by any parents in iling the history of their children. Drowsi- s, listlessness, loss of desire to play and failing lth were described by eight parents. Thus, neral symptoms were infrequent. Although derweight or malnutrition was mentioned only e, examining physicians stated that poor trition was present in 63, or 39.1 per cent, of patients. Underweight was common, es- ially in persons with ascariasis, severe ancylos- miasis or a combination of these two infec- ns.

The average hemoglobin level and the erythro- e count were 62 per cent and 3,600,000, respectively. These values compared favorably with values observed in a small comparative group, although hemoglobin values below 60 per cent were more common in the parasitized than in the comparative group. Anemia occurred most commonly in patients suffering from ancylostomiasis, trichuriasis or strongyloidiasis. The value of an increased eosinophil count in the diagnosis of helminthiasis has been stressed repeatedly, but the frequency with which this eosinophilia was recorded in the present survey did not seem to warrant the attaching of unusual significance to it. When eosinophilia is found, a search for intestinal parasites should be made, but the absence of eosinophilia does not preclude their presence.

Sensitivity to foreign proteins, generalized toxemia, asthma and urticaria have been reported, particularly in persons with ascariasis. Asthmatic bronchitis was observed in 4 patients, all of whom were infected with Ascaris lumbricoides, but passage of the parasites through the lungs seemed to offer a more satisfactory explanation than allergy. Toxemia of varying degree, lasting several days, was encountered frequently after administration of some anthelmintic agents. Probably this was due to the absorption of decomposition products of dying or dead parasites, especially ascarides, since the anorexia, listlessness and weakness and often the fever disappeared within a few days following treatment.

Restlessness, irritability, meningismus and convulsions were uncommon. Convulsions have been attributed frequently to parasitism. In this survey, however, convulsions occurred in only 3 children, all of whom had acute febrile infections. These acute infections offered a more tenable explanation than did intestinal parasitism. None of the 42 children with parasitism alone had convulsions.

One of the most interesting observations in this study was prolapse of the rectal mucosa. This occurred in 4 patients, all of whom had trichuriasis, diarrhea and stools streaked with bright red blood.

Although a number of vermifuges were used, the safest, mose efficient and easiest to administer was hexylresorcinol. It was most effective in the treatment of ascariasis and was less effective for ancylostomiasis. So far as Trichuris trichiura, Strongyloides stercoralis and Enterobius vermicularis were concerned, it seemed only to reduce the number of parasites present. When the oral administration of hexylresorcinol was combined with the use of the drug as a retention enema, the effect on these parasites was enhanced,

8. Keller, A. E.; Casparis, H., and Leathers, W. S.: Clinical Study of Ascariasis, J. A. M. A. **97**:302-306 (Aug. 1) 1931.

particularly in persons with heavy infections with Trichuris trichiura. Tetrachloroethylene was found to be ineffective as an ascaricide but highly effective against the hookworm. It seemed to be of little value in the treatment of infections due to the other parasites. The results obtained from oil of chenopodium in treatment of ascariasis and ancylostomiasis were in no way comparable to the results obtained with hexylresorcinol. Gentian violet medicinal was of definite value in the treatment of oxyuriasis and strongyloidiasis, but it did not eliminate these infections completely. Although recommended highly, the latex of Ficus laurifolia and the Colombian preparation *Higueronia* were ineffective, particularly against trichuriasis. No form of therapy was found which regularly and completely eliminated Strongyloides stercoralis, Trichuris trichiura or Enterobius vermicularis.

Whatever treatment is used for ascariasis, ancylostomiasis and strongyloidiasis, only those parasites actually present within the gastrointestinal tract can be eliminated. Larvae en route are unaffected. Stools of such patients should be examined monthly for three successive months and treatment administered again if ova are found. Although most patients return to their original environments, where chances for reinfection are many, treatment gives these children a fresh start which carries them along until reinfection occurs. As they grow older, they do not seem to become infected so heavily and are able to withstand such infection better than the younger children.

Elimination of all parasites from the patient should be supplemented by measures to prevent reinfection. To accomplish this, it is vital that provision be made for the sanitary disposal of feces. Only in that manner can the vicious cycle of infection, soil pollution and reinfection be broken. Prevention of ascariasis, ancylostomiasis, trichuriasis and strongyloidiasis therefore becomes an integral part of rural sanitation, and proper disposal of feces by means of flush toilets or properly constructed latrines.

CONCLUSIONS

Of 161 children infected with multiple intestinal parasites, 119, or 74 per cent, were brought to the hospital with conditions other than parasitism and 42, or 26 per cent, with symptoms largely accounted for by the parasitic infection alone.

In the majority of the patients studied, polyparasitism either caused no serious symptoms or was productive of symptoms of the type which parents ignore or dismiss.

Vomiting, vomiting of worms, fever, diarrhea, anorexia, passing of worms by bowel and abdominal pain are the most frequent symptoms. Underweight occurs in 40 per cent of patients.

Even though a child may harbor several intestinal parasites, occasionally one of these parasites will predominate and will produce symptoms and signs characteristic of that parasite.

Eosinophilia occurs in less than 20 per cent of patients.

Hexylresorcinol is the most effective vermifuge in the treatment of ascariasis. Tetrachloroethylene is most effective for ancylostomiasis. None of the drugs used seem completely effective for strongyloidiasis, trichuriasis or oxyuriasis.

Polyparasitism is related to contact with a soil polluted with embryonated ova. Prevention of infection cannot be accomplished without prevention of soil contamination. Sanitary disposal of feces is of vital importance in such a plan of prophylaxis.

ANCYLOSTOMIASIS AND STRONGYLOIDIASIS

A CLINICAL SURVEY OF SEVENTY-ONE CASES OF ANCYLOSTOMIASIS AND ELEVEN CASES OF STRONGYLOIDIASIS IN CHILDREN

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It is common knowledge that infection with testinal parasites is encountered frequently in e tropics. Excellent reports dealing with the idence of human intestinal parasitism have peared in the literature. However, clinical dies confined to problems relating to infection childhood are relatively infrequent.

SOURCE OF MATERIAL

This study is based on observations of 71 secutive patients with ancylostomiasis and 11 h strongyloidiasis admitted to the pediatric rds of Gorgas Hospital, Ancon, Canal Zone, m Jan. 1, 1941 to Jan. 1, 1944. Although h infections were discovered frequently, those hout associated intestinal parasites were not mmon. For purposes of our report, only ients with either unmixed ancylostomiasis or ngyloidiasis were studied. Those with poly-asitism were excluded. In this hospital, no empt has been made to distinguish the various cies of hookworm one from the other, and e terms ancylostomiasis, uncinariasis and hook-rm disease have been used interchangeably.

GENERAL CONSIDERATIONS

In general, both hookworm and Strongyloides rcoralis infect patients in a similar manner. e filariform larvae enter the skin or mucous mbrane and are carried by the blood stream the lungs, where they pass through the eolar membrane, are coughed up into the rynx and are swallowed. Of the numerous ferences in the life histories of these parasites, o of prime clinical importance must be kept mind. The first is that the adult hookworm aches itself to the intestinal mucosa with its uth parts and feeds on the blood of the host, ile the female strongyloides nests in or rrows into the folds of the mucosa, causing tarrhal inflammation and some sloughing of testinal mucosa but much less loss of blood than is caused by the hookworm. The second difference is that rhabditiform larvae of S. stercoralis hatch out in the lumen of the intestine while the larvae of the hookworm characteristically hatch out only after they are free from the body of the host. Thus, according to many authorities, the rhabditiform larvae of Strongyloides may metamorphose into the filariform larvae either in the intestine or in feces soiling the perianal region. These larvae, by penetrating the mucosa or skin, hyperinfect the host. Hyperinfection does not occur in hookworm disease.[1]

ANCYLOSTOMIASIS

CLINICAL CONSIDERATIONS

Location of Dwellings.—It has been pointed out by Keller, Leathers and Densen,[2] of the Rockefeller Sanitary Commission, that ancylostomiasis is associated with contamination of the soil with human feces. In order to determine the validity of this observation locally, living conditions on the Isthmus of Panama were separated into three types as follows: (1) United States government communities located in the Canal Zone, characterized by minimal crowding, excellent toilet and sewage disposal facilities, paved streets and landscaped yards; (2) principal cities of the Republic of Panama (Colón and the city of Panama), in the center of which the overcrowding among the poor is commonplace, facilities for sewage disposal are adequate although not used to the fullest extent by an uninformed populace and streets and alleys are paved; in the outskirts of these cities, however, sewage disposal facilities are minimal, the streets are unpaved and landscaping is absent; (3) rural or semirural communities in the Canal Zone or Republic of Panama (interior), where population is sparse, living conditions are primi-

From the Pediatric Service, Gorgas Hospital, Ancon, al Zone.

1. Faust, E. C.: Human Helminthology, ed. 2, Philadelphia, Lea & Febiger, 1939, pp. 415 and 391.
2. Keller, A. E.; Leathers, W. S., and Densen, P. M.: Result of Recent Studies of Hookworm in Eight Southern States, Am. J. Trop. Med. **20**:493, 1940.

tive and sanitation conspicuous by its absence, even outhouses being infrequent.

Data available on 69 of the 71 patients were analyzed, revealing the following results: Five (7 per cent) were from the United States government communities, 12 (17 per cent) from principal cities of the Republic of Panama and 52 (76 per cent) from rural districts.

Age.—The age distribution of the patients in this survey is shown in table 1. In a similar

TABLE 1.—*Age Distribution in 71 Cases of Ancylostomiasis and 11 Cases of Strongyloidiasis*

Age in Years	Ancylostomiasis Number of Patients	Strongyloidiasis Number of Patients
1	2	3
2	2	1
3	0	2
4	5	0
5	3	1
6	16	0
7	8	0
8	5	2
9	12	0
10	5	1
11	7	1
12	6	0

study of ascariasis,[3] it was noted that one half of the children were infected by the time they reached the age of 4 years. Only 9 children (12 per cent) with ancylostomiasis had been infected at this age.

Sex.—There were forty-six boys (65 per cent) and 25 girls (35 per cent).

Race.—In this series, there were 34 mestizos (varied mixtures of white, Indian, Negro and oriental races), 33 Negroes and 4 white children.

SYMPTOMATOLOGY

It was noted that hookworm disease rarely produced symptoms serious enough to cause children to be brought to the hospital. All the patients were brought in for diagnosis and treatment of other diseases, and the helminth infection was coincidentally discovered by routine examination of the stool. The associated unrelated diseases encountered in this group of 71 patients were as follows:

Malaria	49
Acute infections of the respiratory tract	10
Acute exanthems	4
Acute gastroenteritis	1
Miscellaneous	7

In view of the fact that on the Isthmus of Panama the areas which are lacking in adequate sanitary and sewage disposal facilities are a lacking in mosquito control, it was not surpris to find such a high incidence of malaria.

Even after a most liberal analysis, hookwo infection was found to produce few sympto Burning on urination in a girl and abdomi pain in another patient, which could not attributed to any condition other than an lostomiasis, were noted. Another child (c 1) had considerable pallor and symptoms acute cardiac decompensation. Possibly abdominal pain in 1 patient and vomiting i others could have been due to hookworm dise All other symptoms observed were adequat explained on the basis of associated disea The most striking feature in this series was absence of subjective symptoms. Even in anemic patients, no subjective symptoms w noted until the anemia reached such a deg that critical heart failure supervened. This p is well illustrated by the cases reported.

Malnutrition and underdevelopment were features in this series. Four of the 71 pati were malnourished, but the malnutrition served was accounted for by the associa diseases.

LABORATORY CONSIDERATIONS

Hemoglobin.—The Tallqvist technic was u in making most of the determinations, altho the anemic patients usually were checked by Sahli method. In table 2 are listed the va obtained. These are contrasted with values served in a comparative group consisting of

TABLE 2.—*Hemoglobin Determinations in 71 Case Ancylostomiasis and 11 Cases of Strongyloidias Contrasted with Values Obtained in a Series of 30 Apparently Normal Children Residing on the Isthmus of Panama*

	Per Cent of Patients		
Per Cent of Hemoglobin	Ancylostomiasis	Strongyloidiasis	Comparat Group
10	1.4	0	0
40	4.5	9	0
50	8.5	27	6
60	51.8	27	35
70	32.4	37	59
80	1.4	0	0

children admitted to the surgical service w simple uncomplicated fracture and free f medical disease. As may be seen from this ta the majority of infected patients had value the low normal range as determined for child reared in Panama. The 6 anemic patients had values for hemoglobin under 60 per also had malaria. In the 5 with values betw 40 and 60 per cent, the anemia could have b due either to malaria alone or, much more lik

3. Einhorn, N. H.; Miller, J. F., and Whittier, L.: Ascariasis: Clinical Survey of One Hundred and Twenty-Five Cases of Infection with Ascaris Lumbricoides in Children, Am. J. Dis. Child. **69**:237 (April) 1945.

a combination of malaria and hookworm dis-
e. The 1 child with a hemoglobin content of
per cent (case 1) was more anemic than is
aracteristic of persons with the severest un-
mplicated malaria. Since this patient had an
te primary estivoautumnal malaria of four
s' duration, the anemia probably was due
gely to ancylostomiasis.

Erythrocyte Counts.—In table 3 are listed the
throcyte counts together with the counts ob-
ned in the comparative group. Those with

LE 3.—*Erythrocyte Counts in Ancylostomiasis and Strongyloidiasis Contrasted with Values Obtained in a Series of 30 Apparently Normal Patients*

Erythrocyte Count, Millions	Per Cent of Patients		
	Ancylostomiasis	Strongyloidiasis	Comparative Group
s than 3.0	6.2	0	9
0 to 3.5	7.7	30	30
5 to 4.0	57.0	40	37
0 to 4.5	26.2	20	24
5 to 5.0	3.1	10	0

nts below 3,000,000 were the same patients
ntioned previously with values for hemoglobin
w 60 per cent.

Leukocyte Counts.—All but 4 leukocyte counts
between 4,000 and 11,000, with a median of
00. Leukocytosis when present was accounted
by the associated unrelated infections.

Differential Leukocyte Counts.—These were
ntially normal. Only 1 patient had an
inophil count of over 4 per cent. The absence
eosinophilia is contrary to reported observa-
ns.

Stool Examination.—A careful microscopic
mination of the feces was made routinely for
patients. This was supplemented frequently
repeated examinations and concentration
nics. In the case of hookworm disease, it
s felt that infection so mild as to require
centration technics could be disregarded clin-
ly. Only patients who showed ova on exam-
ion of an unconcentrated stool specimen were
uded in this study. Oxyuriasis was not ruled
positively by the failure to find ova on a single
ophane tip. However, this parasite is uncom-
n in the local mestizo and Negro groups, and
symptoms differ widely from those of hook-
m disease.[4] Still, it was possible that the
mentioned previously who complained of
ning on urination had an undiscovered in-
ion with Enterobius vermicularis, since it was
cult to associate this symptom with the
pathologic changes of ancylostomiasis. Any other complicating intestinal helminth infection severe enough to be important clinically would have been discovered by the studies carried out.

TREATMENT

Fifty-nine patients were treated with hexylresorcinol by mouth. Of these, 32 were also given tetrachloroethylene four to five days later because the stools remained positive. This routine proved to be satisfactory. Hexylresorcinol is a good ancylostomacide and perhaps somewhat less toxic than tetrachloroethylene, with the added advantage of also being an excellent ascaricide.

Oil of chenopodium was used for 6 of the earlier patients. It proved to be less satisfactory than the other agents and was discarded.

Preparations containing iron and transfusions of blood or both were used in combating anemia, depending on its degree.

REPORT OF CASES

Of the 71 patients in our study, only 1 showed severe manifestations, and his case is given here in detail.

CASE 1.—A 9 year old mestizo boy from the interior of Panama entered the hospital with the complaints of generally poor health for one year, chills and fever, diarrhea and productive cough for three days. Physical examination revealed an acutely ill, poorly nourished child, breathing rapidly and with considerable pallor of the mucous membranes, palms and soles. The temperature was 104.6 F. and the pulse rate 140 and irregular. There were a few inconstant rales over both lungs; the heart was considerably enlarged to the right and left and the spleen was not palpable.

Laboratory Data.—The stool was loaded with hookworm ova. Material obtained with a cellophane swab was negative for ova of E. vermicularis. Examination of the blood revealed: hemoglobin concentration, 10 per cent (Sahli); erythrocytes, 1,200,000, and leukocytes, 10,000 with neutrophils 74 per cent, lymphocytes 25 per cent and eosinophils 1 per cent. A moderate number of ring forms of estivoautumnal malaria were found, but no crescents were observed. Results of tests for sickling of erythrocytes, the Kahn test of the blood and a urinalysis were negative. The teleroentgenogram of the chest showed a pronounced enlargement of the heart in all diameters, but the lungs were normal.

Treatment.—The patient was given an immediate transfusion of citrated blood, and this procedure was repeated the following day. Quinacrine hydrochloride was administered, with prompt return of the temperature to normal and disappearance of malarial parasites from the blood. On the third day, hexylresorcinol was given and four days later tetrachloroethylene. One week after his admission to the hospital a second roentgenographic study of the chest showed that the heart had returned to normal size. A preparation containing iron was administered. Three weeks after admission the child was discharged, greatly improved, with a hemoglobin content of 50 per cent (Sahli), an erythrocyte count of 3,300,000 and stools free of parasites and ova.

4 Miller, J. F., and Einhorn, N. H.: Oxyuriasis: Clinical Survey of Two Hundred Consecutive Cases Infection with Enterobius Vermicularis in Children, J. Dis. Child. **68**:376 (Dec.) 1944.

The severe anemia manifested by this patient was considered as being due to ancylostomiasis. There was no history of chronic malaria, the spleen was not enlarged, and no crescents were found in the blood. It is probable that this attack of malaria was acute, primary and of only a few days' duration. Response to the replacement of blood was prompt and thorough.

Of 2,133 children and infants on whom autopsies have been performed in Gorgas Hospital during the past forty years, 2 were found in whom the cause of death was hookworm disease. These 2 patients were excluded from the survey because their infections did not occur during the period covered and because 1 patient (case 3) had other intestinal parasites (Ascaris lumbricoides and Trichuris trichiura) than those reported here. However, the cases of both patients illustrate factors of clinical importance in ancylostomiasis, and therefore it was deemed advisable to present brief abstracts. Although postmortem examinations were complete, only pertinent observations have been summarized in this report.[5]

Case 2.—A 7 year old mestizo boy from the interior of Panama was admitted to the hospital with a complaint of pallor of seven months' duration. Two weeks before admission he began vomiting frequently and suffered from a constant mild epigastric pain. Physical examination revealed an acutely ill, poorly developed and poorly nourished boy with a waxen yellow color, weighing 33 pounds (15 Kg.) and measuring 41 inches (104 cm.) in height. The face appeared puffy, but true pitting edema was not noted in any part of his body. The pulse rate was 160; the heart sounds were of poor quality and a loud systolic murmur was heard over the precordium. The lungs were normal. The abdomen was moderately distended; no fluid wave was present and the spleen and liver were not palpable.

Laboratory Data.—The stool contained some red blood cells and was loaded with hookworm ova. Examination of the blood revealed a hemoglobin content of 13 per cent (Sahli), 1,100,000 erythrocytes and 11,700 leukocytes, neutrophils 68 per cent, lymphocytes 28 per cent and eosinophils 4 per cent; thick and thin smears of blood were negative for malaria parasites, and the Kahn reaction of the blood was plus-minus.

The patient had a severe spastic convulsion and died before he was given treatment.

Autopsy Observations.—Head and Neck: Except for pallor, the meninges and brain showed no abnormality. The mucosa of the trachea was pale and covered with clear mucus.

Thorax: The pleuras were smooth and glistening, and a minimal amount of fluid was present in the pleural cavities. The lungs were grayish pink and showed no gross or microscopic abnormality. The peribronchial lymph nodes were slightly enlarged and on section showed moderate edema with a few leukocytes in the sinuses. The heart (weight 215 Gm.) was enlarged, owing principally to dilatation, but there was also moderate hypertrophy. The myocardium was of a li tannish brown color and mottled in appearance ow to a scattering of cream-colored patches. The ri auricle was large and slightly dilated; the left auri thickened and grayish white. The great vessels w normal. In microscopic section, the muscle fibers peared granular, moderately vacuolated and uneve stained.

Abdomen: The liver (weight 505 Gm.) was so what enlarged and showed marked fatty infiltrati The spleen was normal in size, and the sinuses w dilated and infiltrated with polymorphonuclear leu cytes and eosinophils. The kidneys showed slight eder

Gastrointestinal Tract: The wall of the small of the large intestine was covered with numerous wor measuring about 1.6 cm. in length and identified as the species Necator americanus. No other parasi were found. The remainder of the intestine had a p mucosa with slight edema of the wall. Peyer's patc were hypertrophied, but no scars or ulcers were no Numerous hookworms were found also in the la intestine.

Causes of Death: The causes of death were (1) fection with N. americanus, (2) severe anemia and cardiac hypertrophy and dilatation.

Case 3.—A 3 year old mestizo girl from the inter of Panama was admitted to the hospital complaining cough, abdominal pain and vomiting of two days' du tion. Physical examination revealed a critically dyspneic child with pale mucous membranes and pal of the palms and soles. She weighed 25 pounds (1 Kg.) and measured 34 inches (86 cm.) in length. abdomen was distended. The heart rate was 160 minute; the sounds were of poor quality, but murm were not heard. The lungs were clear, but the spl and liver were not palpable.

Laboratory Data.—The stool was loaded with ho worm ova and also contained a few ova of A. lumb coides and T. trichiura. Analysis of the blood g the following results: hemoglobin content 10 per c (Sahli); erythrocytes, 1,300,000, and leukocytes 11,2 with neutrophils 6 per cent, lymphocytes 36 per c and eosinophils 3 per cent. The urine was normal.

This patient was given a transfusion of citrated bl but died six hours after admission to the hospital.

Autopsy Observations.—Head: Except for p nounced pallor, the meninges and brain were norm

Thorax: A few flimsy adhesions were present the apex of the right lung. The lungs (weight 150 G each) were gray, slightly crepitant, rather firm extremely moist. The mucosa of the bronchi smooth and pale. On microscopic examination, pleura showed some fibrotic thickening and infiltrat with lymphocytes and plasma cells in the area of adhesions. Some of the alveoli contained serous ma rial, but no true pneumonia was present. No paras larvae were observed. The pericardium contained cc. of clear pale yellow fluid. The heart (weight Gm.) was enlarged moderately; the myocardium soft and pale brown, and the endocardium was smo and pale.

Abdomen: No free peritoneal fluid was present. liver (weight 450 Gm.) showed moderate fatty infilt tion. The spleen (weight 110 Gm.) was firm and d red and on section showed some fibrosis and poo defined malpighian corpuscles, and yellow amorph material resembling blood pigment was scatte throughout the organ.

Gastrointestinal Tract: About 40 hookworms w found lying on the wall of the jejunum and the ile

5. Col. L. B. Bates, Chief of the Board of Health Laboratory, gave permission to use this autopsy material.

le an additional 50 were found free in the contents. se parasites were identified as N. americanus. In dition, 1 adult ascarid (A. lumbricoides) was found in midportion of the ileum and about 80 trichurids re found in the cecum and ascending colon. There s no ulceration of the bowel, and the lymphoid tissue s not especially prominent.

Causes of Death: The causes of death were: (1) ction with N. americanus; (2) severe anemia; (3) diac hypertrophy and dilatation. Contributory causes re: (1) infection with A. lumbricoides and T. hiura; pulmonary edema.

STRONGYLOIDIASIS

CLINICAL CONSIDERATIONS

A fact which became evident early in this rvey was that strongyloidiasis is uncommon in ldren in this area and even more uncommon en unassociated with other parasitic infec-ns. In three years, there were only 11 cases of nixed strongyloidiasis. During the same riod, 100 cases of unmixed oxyuriasis, 125 of ariasis, 50 of trichuriasis and 71 of ancy-tomiasis were diagnosed. There were, how-r, 33 cases of strongyloidiasis associated with er parasites.[6]

Location of Dwellings.—Six patients lived in itated areas within the Canal Zone or the public of Panama and 5 in unsanitated rural mmunities.

Age.—The age distribution is shown in table Of interest was the fact that 4 of the 11 ients were under 3 years of age. The young-was a 16 month old white child from the er socioeconomic level, who had lived all life in a government community of the al Zone.

Sex.—Five boys and 6 girls were included in s study.

Race.—Eight patients were Negroes, 2 were stizos and 1 was a white child.

SYMPTOMATOLOGY

Associated unrelated diseases were encoun-ed frequently. Five patients had malaria, 2 te infections of the respiratory tract, 1 hma, 1 chronic nephritis and 2 had no as-iated diseases. As with hookworm disease, mptoms were analyzed by ruling out those to associated disease. In contrast to inariasis, symptoms due to infection with stercoralis were far from rare, even in this all group. Vomiting was observed in 2 chil-n, diarrhea in 2 and loss of weight, headache, derness over the abdomen and lethargy in 1 h. The 2 patients with diarrhea were under 2 years of age. Both showed a rather definite syndrome of intermittent attacks of vomiting and diarrhea extending over a period of several months without fever or associated disease. Both had mucus and microscopic or occult blood in the stool. Recovery occurred as soon as the parasites were eliminated from the stool through the use of gentian violet medicinal. All other causes of diarrhea with blood and mucus in the stool were ruled out. Nutritionally, the group was average.

LABORATORY OBSERVATIONS

Hemoglobin Concentration and Erythrocyte Counts.—In table 1 are listed the values for hemoglobin in these 11 patients. In 4 the hemoglobin fell below 60 per cent. Two of these children had malaria. In the other 2 the anemia was due apparently to strongyloidiasis, since 1 had no associated disease and the other had asthma. In table 3 are listed the erythrocyte counts, which closely approximated those in the comparative group.

Leukocyte and Differential Counts.—The leukocyte and differential counts were normal except when influenced by coexisting disease. Eosinophilia was not a feature. Only 2 of the 11 children had more than 4 per cent eosinophils, and 1 of these was asthmatic.

Stool Examination.—For all the patients the infection was diagnosed by finding rhabditiform larvae of S. stercoralis in the stool. Blood was found by microscopic examination in 2 patients and by means of the guaiac test in 1. Guaiac tests were not done for the remaining 8 patients, but red cells were not observed on microscopic examination of the stools.

TREATMENT

Six patients were treated with hexylresorcinol, 1 with tetrachloroethylene and 2 with gentian violet medicinal. Two were not treated. The results of treatment were not followed well except in the 2 children treated with gentian violet. Of the 6 treated with hexylresorcinol, 3 had no follow-up stool examination, 2 had stools still positive for parasites and 1 had negative stools. There was no follow-up stool examination for the child treated with tetrachloroethylene. Gentian violet was used for the 2 infants who vomited and had intermittent diarrhea. After sixteen days of treatment, the symptoms cleared up, blood no longer appeared in the stool, as evidenced by microscopic examination and the guaiac test, and the stool contained no parasites or ova. The medicine was given to these babies by the physician, who inserted the tablets into

6. Einhorn, N. H.; Miller, J. F., and Whittier, L.: Intestinal Polyparasitism in Children, to be published.

the esophagus with his forefinger. Preparations containing iron were administered to the anemic patients. None in the group was given blood transfusions.

COMMENT

The Rockefeller Sanitary Commission found that hookworm disease is intimately associated with infected soil. A rather puzzling observation during the present study was that about one fourth of the patients gave addresses in areas with facilities for sewage disposal. It was felt, however, that many of these children acquired their infections in the country and were brought into town later by relatives who worked for agencies of the United States Government.

Parasitologists [1] testify as to the possibility of infection by hookworm and S. stercoralis via the oral route. The occurrence of infection in small infants, the absence of ground itch and the frequent association of these parasites with A. lumbricoides and T. trichiura suggest that oral infection with hookworm and S. stercoralis might be of importance in small children and infants. The observations are especially significant in strongyloidiasis, in which infection by direct personal contact is theoretically possible. In the 2 infants referred to, contact with infected soil seemed unlikely. The circumstances were such as to make direct infection by nursemaids a strong possibility. Infection by direct contact with hookworm does not occur, owing to peculiarities in the life history of this parasite. The high incidence of ancylostomiasis in the mestizos and Negroes was due undoubtedly to the frequency of poverty and primitive living conditions among these people.

The symptomatology of hookworm disease as seen in this series raises some interesting points. Only 8 of 71 patients had symptoms attributable to the worm infection, and in only 1 (case 1) was the relationship certain. Keller, Leathers and Densen,[2] in their observations on hookworm disease in the southern United States, found that 25 per cent of infected people had symptoms. Pulmonary symptoms produced by passage through the lungs were not observed in the present series or, if seen, were not distinguishable from the usual infections of the upper respiratory tract. Geophagy was not encountered. In general, neither weight nor development was affected except in cases of severe infection described in detail previously. Odriosola,[7] in a study of 34 children with ancylostomiasis in Paraguay, found no significant malnutrition or stunting. He also reported slight fever, considerable distenti and severe anemia. Among his patients th was a high incidence of syphilis and tuberculos which made the data difficult to evaluate.

The key to the symptomatology of hookwo disease is the degree of anemia produced by infection. In Puerto Rico, Castle and associate discovered a relation between adequate iron the diet and the tendency to development anemia in ancylostomiasis. The dietary in interior of Panama seems to be adequate in ir protein and vitamins. This is indicated by series of dietary histories taken by Miss Tomlinson [9] on a group of workers comi directly from the country to this hospital and the fact that deficiency diseases are rarely se here. It is possible that the absence of geopha malnutrition and underdevelopment in t group of patients, as well as the infrequency severe anemia except in heavily infected childr was related to this adequacy of diet. The sev infections may have been influenced by quanti tive and qualitative starvation.

The first consideration in treatment is tra fusion of blood to all patients who have sev anemia. This therapeutic approach sho prevent fatalities in all but the few whose hea are too badly damaged to respond. The wor must be eliminated or reduced by an appropri vermifuge and, finally, an adequate diet est lished. The latter should be planned in acco ance with the economic and geographic status the patient and be consistent with the mo of his people. While iron-containing prepa tions and commercial vitamins should be adm istered temporarily, they do not take the pl of a good diet. Education in the disposal feces is of the utmost importance. Outhou can be constructed at little cost. The introd ion of the wearing of shoes is advisable but practical, because the average inhabitant of tropics cannot afford shoes.

S. stercoralis must be placed in the class important symptom-producing parasites children.[10] The symptomatology is what wo be expected from the pathologic changes. T

7. Odriosola, R.: Clinical Studies of Ankylostomiasis in Children, Pediat. Américas **1**:449, 1943.

8. Castle, W. B.; Rhoads, C. P.; Lawson, H. and Pain, G. C., cited by Strong, R. P.: Stitt's Di nosis, Prevention and Treatment of Tropical Disea ed. 6, Philadelphia, The Blakiston Company, 1942, 2, p. 1269.

9. Tomlinson, M.: Personal communication to authors.

10. Hinman, E. H., cited by Strong, R. P.: St Diagnosis, Prevention and Treatment of Tropical D eases, ed. 6, Philadelphia, The Blakiston Compa 1942, vol. 2, p. 1284.

intestinal irritation and loss of blood resulting from the burrowing of the female parasite into the mucous membrane of the bowel seems adequate to explain the occurrence of diarrhea, vomiting and slight bleeding from the bowel. Gentian violet was found to be relatively effective in reducing the number of parasites. Anemia is infrequent and mild in contradistinction to that observed in severe ancylostomiasis, but when present it should be treated by iron and proper diet.

SUMMARY

A clinical survey of 71 cases of ancylostomiasis and 11 cases of strongyloidiasis revealed a definite difference in symptoms of the two diseases, in spite of the biologic similarity of the causal parasites.

The hookworm infrequently causes symptoms. When symptoms are present, they result from loss of blood and of blood-forming elements.

Strongyloides causes less loss of blood but acts as an intestinal irritant, manifested by diarrhea and vomiting.

Case Reports

CHRONIC MYELOGENOUS LEUKEMIA IN INFANCY

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Chronic myelogenous leukemia is uncommon in childhood and rare in infancy. The disease seldom occurs in infants less than 6 months of age. In 1933, Cooke [1] reported 3 cases encountered in the St. Louis Children's Hospital during a period of fifteen years. The patients were 8 years old or older. Poncher, Weir and Limarzi,[2] in 1942, surveyed the literature and found only 2 cases of myelogenous leukemia which they thought could be considered chronic and in which the disease had its onset in early infancy. These 2 cases had been reported by Solmitz [3] and Malmberg [4] in 1924. Poncher, Weir and Limarzi reported 1 case of their own in which the disease was thought to be of congenital origin. The diagnosis was made when the infant was 6 weeks old. Death occurred at the age of slightly more than 3 months; hence the child was under observation for only about six weeks.

In the other cases of myelogenous leukemia in infancy that have been reported the disease could be classified as acute. Salomonsen [5] (1930), Morrison, Samwick and Rubinstein [6] (1939) and Chaudhuri [7] (1942) each reported 1 case. Rhamy,[8] in 1938, reported possible occurrence of the disease in a newborn baby, the diagnosis being doubtful. Kelsey and Andersen,[9] in 1939, collected from the literature 8 cases in which they accepted the diagnosis as unquestionable, and added 1 case of their own.

In the case of chronic myelogenous leukemia reported in this paper, the disease occurred in an infant less than 3 months old. The disease may have been present at birth, since the mother reported that signs were noted at the age of 3 weeks.

REPORT OF CASE

An infant, aged 3 months, was admitted to the Mayo Clinic on June 22, 1942 because of bleeding from the rectum. Her mother had noticed when the baby was 3 weeks old that small scattered dark spots appeared on the infant's skin when she cried. These would remain for some days and then disappear. The blood in the stools had been noticed for only a few days before admission.

On physical examination the infant weighed 11 pounds 12½ ounces (5,340 Gm.). The spleen was considerably enlarged, at least 3 fingerbreadths below the costal margin. The liver also was enlarged about 2 fingerbreadths below the costal margin. The cervical lymph nodes were enlarged. The vessels of the scalp were prominent. There was slight miliaria scattered over the trunk, and small anal abrasions were present.

Examination of the urine gave negative results except for the presence of a few erythrocytes. The concentration of hemoglobin was 8.4 Gm. per hundred cubic centimeters of blood; the erythrocytes numbered 2,900,000 and the leukocytes 29,800 per cubic millimeter of blood. The differential count revealed 43.5 per cent lymphocytes, 14 per cent monocytes, 24.5 per cent neutrophils, 2 per cent eosinophils, 2.5 per cent basophils, 3 per cent myelocytes, 4.5 per cent promyelocytes, 1 per cent leukoblasts, 0.5 per cent stem cells, 2 per cent immature lymphocytes and 2.5 per cent metamyelocytes. The blood platelets numbered 73,000 per cubic millimeter. The smear of blood showed myeloid immaturity of such a degree as to include stem cells, together with thrombocytopenia.

A tentative diagnosis of leukemia, probably of the myeloid type, was made.

The patient was given a small transfusion and was observed at frequent intervals. Two weeks after admission to the clinic she began to cough; however, the lungs were clear. There were a few small papules about

From the Section on Pediatrics, Mayo Clinic, Rochester, Minn.

1. Cooke, J. V.: Acute Leukemia in Children, J. A. M. A. **101**:432 (Aug. 5) 1933.

2. Poncher, H. G.; Weir, H. F., and Limarzi, L. R.: Chronic Myelogenous Leucemia in Early Infancy: Case Report, J. Pediat. **21**:73 (July) 1942.

3. Solmitz, W.: Ein Fall von myeloischer Leukämie im ersten Kindesalter, Ztschr. f. Kinderh. **38**:146, 1924.

4. Malmberg, N.: Beitrag zur Kenntnis der myeloiden Leukämie bei Säuglingen, Acta pædiat. **4**:410, 1924.

5. Salomonsen, L.: Leucémie myélogène aiguë chez un enfant de cinq mois, Acta pædiat. **9**:497, 1930.

6. Morrison, M.; Samwick, A. A., and Rubinstein, R. I.: Congenital Leukemia with "Chloroma," Am. J. Dis. Child. **58**:332 (Aug.) 1939.

7. Chaudhuri, K. C.: Acute Myeloid Leukaemia in Infant Four Weeks Old, Indian J. Pediat. **9**:180 (Oct.) 1942.

8. Rhamy, B. W.: Leukemia in the Newborn, with Death at Birth from Traumatic Rupture of the Spleen, Am. J. Clin. Path. **8**:567 (Sept.) 1938.

9. Kelsey, W. M., Jr., and Andersen, D. H.: Congenital Leukemia, Am. J. Dis. Child. **58**:1268 (Dec.) 1939.

e neck. Two weeks later the cough was still present d there was occasional vomiting. There was miliaria er the whole body. The liver and spleen were still larged. The cervical nodes were moderately enlarged, re definitely so than on original examination.

By August 19, when the infant was 5 months old, weight was 13 pounds 7 ounces (6,090 Gm.). The leen was enlarged to below the umbilicus, and both er and spleen were larger than on previous exami- tions. There was evidence of bleeding from the skin the inguinal region and the knee, as well as moderate llor and a few petechiae. The erythrocytes numbered 40,000 and the leukocytes 65,000. The differential unt revealed 40 per cent lymphocytes, 13.5 per cent nocytes, 22.5 per cent neutrophils, 1.5 per cent eosino- ils, 2 per cent basophils, 2.5 per cent myelocytes, per cent promyelocytes, 4 per cent leukoblasts, 5 per nt stem cells, 3 per cent immature lymphocytes, 1.5 r cent normoblasts and 3 per cent metamyelocytes. he blood platelets numbered 28,000.

In March, at the age of 1 year, the child had changed little. She weighed 16 pounds 4 ounces (7,270 Gm.). The nodular, splenic and hepatic enlargement was still present. There were several large dark infiltrated regions on the back of the neck. At times these discharged a yellow sanguineous material and subsequently healed. They apparently caused little distress. The diet consisted of milk, cereals, vegetables, fruits, meats, custards, puddings, egg yolk, orange juice and fish liver oils, all of which were given liberally.

The last examination of the blood, which was made on May 13, revealed 2,390,000 erythrocytes and 118,000 leukocytes. The differential count showed 21.5 per cent lymphocytes, 5.5 per cent monocytes, 35 per cent neutrophils, 2.5 per cent basophils, 9.5 per cent myelocytes, 10 per cent promyelocytes, 2 per cent leukoblasts, 4 per cent stem cells, 1 per cent immature lymphocytes, 1 per cent normoblasts and 9 per cent metamyelocytes.

On June 1, when the child was 15 months old, the papular rash which had been present almost constantly

Hematologic Studies in a Case of Chronic Myelogenous Leukemia

ate of examination	June 23, 1942	Aug. 19, 1942	Nov. 12, 1942	March 11, 1943	May 13, 1943
emoglobin, Gm. per 100 cc. of blood	8.4				
rythrocytes per cu. mm. of blood	2,900,000	2,440,000	1,750,000	2,160,000	2,390,000
eukocytes per cu. mm. of blood	29,850	65,000	112,000	97,000	118,000
fferential count	%	%	%	%	%
Lymphocytes	43.5	40	33.5	31.5	21.5
Monocytes	14	13.5	20	9	5.5
Neutrophils	24.5	22.5	24.5	31	35
Eosinophils	2	1.5	1.5	3	..
Basophils	2.5	2	..	2	2.5
Myelocytes	3	2.5	1.5	4.5	9.5
Promyelocytes	4.5	3	7	7	10
Leukoblasts	1	4	1.5	3	2
Stem cells	0.5	5	2	3.5	4
Immature lymphocytes	2	3	3	0.5	1
Normoblasts	....	1.5	3	3	1
Metamyelocytes	2.5	3	..	5	9

At this time there seemed to be no doubt that chronic yelogenous leukemia was present.

On October 31, when the infant was 7 months old, a acular rash over the scalp and arms was noted. First, all blisters appeared; then hemorrhages into the isters occurred, and each blister became surrounded a red areola; last, the blisters broke and crusts rmed. Transfusion was repeated at this time. The ight was still 13 pounds 7 ounces (6,090 Gm.). eneralized enlargement of the lymph nodes was graded on a scale of 1 to 4, in which 1 represents the least d 4 the greatest enlargement. The leukocyte count as 91,000. The results of differential count were milar to those obtained previously. At this time the mperature rose to 103.8 F. (39.9 C.). There were llicular tonsillitis and increased enlargement of the leen. The patient recovered rapidly from the episode ter the administration of sulfathiazole.

In November, at the age of 8 months, there were o teeth present, and in January 1943 two more teeth peared. At this time the child's weight was 14 pounds, ounces (6,410 Gm.). There was a fine miliary red sh over the trunk, with tiny pearly nodules on the rface of the rash (see the figure).

suddenly became much worse. There were many large dark hemorrhagic regions. The superficial nodes, spleen and liver were larger than previously.

On June 20, the baby suddenly became febrile, her temperature rising to 105 F. (40.6 C.). Rapid respiration with cyanosis developed. She was immediately taken to the hospital but died in the emergency room while being admitted.

Observations at Necropsy.—Multiple petechiae over the whole body and enlargement of the cervical, axillary and inguinal lymph nodes were noted. There was no edema or jaundice. The left pleural cavity and the pericardium contained 10 cc. of thin reddish fluid.

The heart weighed 64 Gm., and the fat appeared to be normal. The cut surface of the heart was pinkish tan. The endocardium and valves were normal except for a small hemorrhage on the posterior leaf of the tricuspid valve. In this region the capillaries were filled with leukemic cells. The coronary arteries were normal.

Bronchopneumonia was present in both lungs. There was a leukemic infiltration, the large vessels being filled with leukemic cells of the granular series, myelocytes, immature and mature neutrophils, myeloblasts and some

nucleated erythrocytes. The capillaries in the alveolar walls were packed with leukemic cells and edema fluid. Erythrocytes and other cells filled the alveoli.

There were considerable enlargement of the spleen and liver and moderate reticular hyperplasia. The sinusoids were filled with leukemic cells and erythrocytes. The portal regions and the large vessels were infiltrated with leukemic cells. The mucosa of the stomach contained multiple petechiae. There were numerous small white nodular regions of leukemic infiltration throughout the entire bowel, with erosion and edema of the mucosa and leukemic infiltration into the submucosa.

Both kidneys were enlarged, with many petechial hemorrhages on the cut surface. The capillary loops of the glomeruli contained scattered leukemic cells, and there were large collections of leukemic cells throughout the cortex.

Patient at age of 8 months. The distribution of the rash is evident. The dark line marks the lower bord of the liver and the spleen.

There was leukemic infiltration of the pancreas, adrenal glands and mammary tissue. The bone marrow was packed with immature cells of the leukoblastic elements, numerous normoblasts and stem cells. There was leukemic infiltration of the skin, and in the mesenteric nodes the sinusoids were filled with leukemic cells and normoblasts.

The brain appeared normal except for congestion of the left hemisphere. There was leukemic occlusion of cerebral and other vessels with edema of the brain and early infarction.

SUMMARY

Chronic myelogenous leukemia is uncommon in childhood and rare in infancy. Only 3 verified cases in infants less than 3 months of age ha appeared in the literature.

One more case of chronic myelogeno leukemia in an infant girl less than 3 mont old is added to those in the literature. T symptoms and signs, which were progressi until death, at the age of 15 months, includ rectal bleeding, nodular, splenic and hepatic e largement, papular rash, cough, vomiting, cutan ous hemorrhages, fever, rapid respiration a cyanosis. The results of laboratory tests in cated the existence of anemia and an increase the number of leukocytes. The smears of blo revealed myeloid immaturity of such a degree to include stem cells, together with thromb cytopenia.

The infant was given two transfusions and high vitamin diet. The weight increased fro 11 pounds 12½ ounces (5.3 Kg.) at the age of months to 16 pounds 4 ounces (7.4 Kg.) at t age of 1 year. At one time the patient had acu follicular tonsillitis and was treated with sulf thiazole, with no untoward reaction.

Necropsy confirmed the gross clinical observa tions and, in addition, disclosed the infiltrati of practically all organs with leukemic cells. I the brain there was leukemic occlusion of cerebr and other vessels, with edema of the brain an early infarction.

CONGENITAL MEDULLARY CYSTS OF THE KIDNEYS WITH SEVERE REFRACTORY ANEMIA

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This paper reports a rare congenital lesion of e kidneys in a child with intractable anemia. he anemia was not explained until routine xamination revealed severe and unexpected otemia, despite minimal urinary changes. hronic progressive anemia and nitrogen re-ntion continued to be the outstanding features uring the subsequent period of eight months. xhaustive clinical, roentgenographic and rologic studies during life could not be correle-ted with the unusual pathologic condition found the kidneys on postmortem examination.

REPORT OF A CASE

History.—The history comprises six hospital admis-ons from Sept. 12, 1942 to May 22, 1943. Brief mmaries of each hospitalization follow, with inclusion only the more significant results of laboratory exami-ations.

First Hospitalization: M. L., a white girl 8 years d, was admitted to the Children's Clinic of the New ork Hospital on Sept. 12, 1942 for study of a pro-und anemia of one year's duration. She was well til she was 4 years old, when she stopped gaining eight and became less active than previously. She ruised easily and had occasional bouts of epistaxis. nemia was detected about one year before this admis-on to the hospital. Six months later she began to mplain of fatigue after ordinary play, vomited occa-onally in the morning and had decided anorexia. The nemia persisted in spite of intensive medicinal therapy.

Both parents were healthy, and there was no history hereditary disease in the family. There were no her children.

Physical examination: The patient was a thin, active ild with pronounced pallor who appeared chronically . Her temperature was normal. Numerous ecchy-oses were present over the thighs, abdomen and an-rior aspects of the tibias. The conjunctivas showed ght icterus. Small lymph nodes were felt in the illas and groins. The lungs were clear. The heart as not enlarged; tachycardia was observed, and a d systolic murmur was heard over the entire pre-rdium. There were no abdominal masses. The edge the liver was felt at the costal margin, but the spleen d kidneys were not palpated.

Laboratory examinations: The blood count on ad-ission revealed a hemoglobin content of 8.5 Gm. per ndred cubic centimeters, and the red cells numbered 50,000 per cubic millimeter. The erythrocytes re-vealed moderate anisocytosis, poikilocytosis and baso-philic stippling; reticulocytes amounted to 1.5 per cent. The response to the tourniquet test was normal. The bleeding time from puncture of the ear was three min-utes and the clotting time four minutes; clot retraction started in one hour and was complete in eighteen hours. The platelets numbered 300,000 per cubic millimeter. The icteric index was 15, and the fragility test of the red blood cells indicated a normal range of resistance to hypotonic solution of sodium chloride. The white cells numbered 4,850 per cubic millimeter, with 6 per cent nonsegmented and 49 per cent segmented polymor-phonuclear leukocytes, 41 per cent lymphocytes, 2 per cent monocytes, 1 per cent eosinophils and 1 per cent myelocytes.

Sternal aspiration on September 14 revealed 101,200 nucleated cells per cubic millimeter. The differential count was as follows: neutrophilic band forms, 26 per cent; segmented forms, 15 per cent; lymphocytes, 27 per cent; eosinophils, 2 per cent; neutrophilic myelo-cytes, 7 per cent; metamyelocytes, 4 per cent; pre-normoblasts, 1 per cent, and normoblasts, 19 per cent. Megakaryocytes numbered 22 per cubic millimeter, and platelet formation in the smears was normal. On ex-amination the bone marrow, therefore, was normal, in both the total number of nucleated elements and the differential count.

The first two specimens of urine contained a faint trace of albumin and no red cells or casts; the specific gravity of each sample was 1.010. The significance of the low fixed specific gravity and the faint trace of albumin was overlooked until later. A culture of the blood yielded no organisms, and apparently the systolic murmur was dependent on the anemia, since it disap-peared after transfusions. The stools showed no blood, and roentgenographic examination of the gastrointestinal tract revealed nothing significant. Roentgenograms of the chest showed no abnormalities and roentgeno-grams of the long bones were normal and without evi-dence of decalcification.

Gastric analysis on September 17 revealed the absence of free hydrochloric acid and a total acidity of 5 degrees in the fasting specimen and free hydrochloric acid of 10 degrees and a total acidity of 15 in the second specimen, obtained thirty minutes after the administration of 50 cc. of 7 per cent alcohol. The finding of hypochlorhydria strengthened the impression that the anemia was based on a deficiency of iron, but administration of iron-containing preparations, dilute hydrochloric acid and in-jections of liver extract were ineffective in improving the anemia.

The results of these studies did not adequately explain the anemia. Subsequent analysis of the blood disclosed the unexpected presence of 85 mg. of urea nitrogen per hundred cubic centimeters of blood, confirmed in re-peated tests two days later by the obtaining of 100 mg. of urea nitrogen. On October 5, analysis of the

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blood showed: urea nitrogen, 108 mg.; serum protein, 8.2 mg. and creatinine 0.8 mg. per hundred cubic centimeters; the serum carbon dioxide content was 30.1 volumes per cent and chlorides totaled 103.1 milliequivalents per liter. Later studies confirmed the diagnosis of impaired kidney function. Excretion of phenolsulfonphthalein was greatly reduced. After intravenous injection of the dye, only 2.5 per cent of it was recovered at the end of ten minutes and a total of 15 per cent at the end of two hours. Concentration tests of the urine on September 30 revealed that the specific gravity ranged between 1.008 at 6 a. m. and 1.010 at 8 a. m.

Intravenous pyelograms on October 1 revealed nonfunctioning kidneys, and retrograde pyelograms on October 2 suggested the possibility of congenital obstruction at the right ureterovesical orifice and mild bilateral hydroureter. The evidence for a definite structural abnormality on either side was, however, equivocal. Staphylococcus aureus was cultured from the bladder urine, but cultures from both ureters were sterile. After fourteen minutes only 1 per cent of injected phenolsulfonphthalein was excreted from each ureter. Catheterized urine from the right ureter contained 10 Gm. of urea and 50 red blood cells and from the left 6 Gm. of urea and 25 red blood cells. Both ureteral specimens exhibited occasional granular, fatty and blood casts.

The opinion of several urologic consultants was that the renal lesion was not obstructive; hence, they advised against surgical intervention.

Blood pressure readings on September 30 and on successive days were 140 systolic and 96 diastolic, 130 systolic and 88 diastolic and 130 systolic and 102 diastolic. Ophthalmoscopic examination showed no changes in the fundi. There was no edema during this and subsequent admissions.

Tuberculin and Schick tests elicited negative reactions. The blood contained 10.5 mg. of calcium and 4.5 mg. of inorganic phosphorus per hundred cubic centimeters on September 15. The icteric index during this hospitalization dropped from 15 to 10.

Four transfusions totaling 900 cc. of blood were sufficient to correct the anemia, and the child was discharged on October 6.

Second Hospitalization: The patient was readmitted to the hospital on November 2, because of rapid progression of anemia. In the interval since discharge, vomiting had increased. On admission, the blood pressure was 130 systolic and 80 diastolic, and subsequent readings were 130 systolic and 100 diastolic and 120 systolic and 90 diastolic. Specimens of urine had a specific gravity ranging from 1.006 to 1.008, with a faint trace of albumin and an occasional red or white blood cell. The blood urea nitrogen content was 91 mg. per hundred cubic centimeters, and standard urea clearances of 4.5 cc. per minute and 4.2 cc. per minute were obtained in consecutive tests. The hemoglobin content on admission was 7.5 Gm. per hundred cubic centimeters of blood, and there were 3,700,000 red cells per cubic millimeter; the readings rose to 12.2 Gm. of hemoglobin and 4,200,000 red cells after the patient had received 880 cc. of blood in four transfusions. It was again observed that the systolic murmur disappeared with correction of the anemia by means of transfusions.

Third Hospitalization: The patient was readmitted on December 15 for a course of transfusions. Before admission, she had had a mild infection of the upper respiratory tract with an elevation of temperature to 100 F. associated with headache. She appeared pale, chronically ill and wasted. Ophthalmoscopic examination showed normal fundi. A loud systolic murmur was again heard over the entire precordium and in the axilla.

On admission, the hemoglobin content was 7.5 G per hundred cubic centimeters of blood, the red ce numbered 3,680,000 per cubic millimeter, with 2 p cent reticulocytes. The red cells showed minor var tions in size and shape, but there was considera stippling. The blood pressure, which had dropped 120 systolic and 70 diastolic before this admission, r during hospitalization to maximum levels of 172 syst and 110 diastolic. Examination of the urine contin to show a faint trace of albumin without formed e ments, and in several specimens the specific grav ranged from 1.005 to 1.010. The blood urea nitrog on December 16 was 50 mg., and on December 22 rose to 110 mg. per hundred cubic centimeters. T icteric index on admission was 7.5. The patient ceived 1,470 cc. of blood in seven transfusions. S was discharged on December 23, with a hemoglob content of 12.5 Gm. per hundred cubic centimeters blood and a red cell count of 4,400,000 per cubic mi meter.

Fourth Hospitalization: In the six week period p ceding this admission, on February 5, morning naus and vomiting were the outstanding symptoms. T blood pressure fluctuated appreciably. The last readi prior to admission was 120 systolic and 80 diastol On admission it had risen to 150 systolic and 90 d stolic, and the patient was pale and appeared chro ically ill. The loud blowing systolic precordial murm had reappeared. The hemoglobin content was 10 G per hundred cubic centimeters of blood, and the r cells numbered 4,000,000 per cubic millimeter. A f of the red cells showed stippling. The blood urea nitr gen on February 9 amounted to 110 mg. per hundr cubic centimeters. The urinalysis showed a speci gravity of 1.010, a faint trace of albumin and an oc sional white blood cell but no other abnormalities.

The patient received 5 transfusions totaling 1,375 of blood. The hemoglobin content rose to 14 Gm. hundred cubic centimeters of blood, the red cells 4,800,000 per cubic millimeter and the volume of pack red cells to 40 per cent. The patient was discharg on Feb. 11, 1943.

Fifth Hospitalization: Since the patient's dischar from the hospital, vomiting had become persistent a she was readmitted on March 5, 1943.

Physical examination showed an emaciated, asthen critically ill child. There were a few ecchymoses the legs. Ophthalmoscopic examination revealed n mal disk margins, moderately tortuous retinal vess and no hemorrhages. The tongue had a thick fur coat. The lungs were clear. The heart was slight enlarged to the left, and a loud systolic murmur w heard over the precordium, which was most evid along the left sternal border. The liver, spleen a kidneys were not palpable. There was no edema. admission, the blood pressure was 146 systolic and diastolic, the hemoglobin content was 11 Gm. per hu dred cubic centimeters of blood and the red cells nu bered 4,400,000 per cubic millimeter. The blood ur nitrogen was 193.5 mg. and the serum protein, 7.7 G per hundred cubic centimeters of blood; the serum c bon dioxide content was 34.7 volumes per cent, a the chlorides measured 89.2 milliequivalents per lit During this admission the plasma carbon dioxide-co bining power dropped to the low level of 15 volum per cent on March 18, and the urea nitrogen rose 265 Gm. per hundred cubic centimeters of blood. March 8, the blood creatinine amounted to 1.2 mg. a on March 19 the serum calcium level was 8 mg. a the inorganic phosphorus level 8.5 mg. per hundr cubic centimeters of blood. Specimens of urine show

range of specific gravity from 1.000 to 1.010. Albumin as consistently recorded as 1 plus; casts were absent, nd an occasional red or white cell was noted in the diment. To combat the acidosis, the child was given merous infusions of dextrose in isotonic solution of dium chloride and sixth-molar lactate solution. Six ansfusions totaling 2,000 cc. of blood did not correct e moderate anemia. A low protein diet was pre-cribed. Vomiting decreased in severity, but the ano-xia persisted. The child was discharged on April 24.

During this admission the child's status was discussed telephone with Dr. Warfield T. Longcope, of Balti-ore. He stated that he and Dr. Thorn had observed condition in several children presenting similar fea-res, in which the kidneys had contained numerous sts in the medulla without involvement of the cortex.

Sixth Hospitalization: Since discharge, anorexia had en extreme and the fluid intake poor. The patient was 7.6 mg. and inorganic phosphorus 12 mg.; serum carbon dioxide content was 30.5 volumes per cent, and the chlorides measured 79.7 milliequivalents per liter.

The urinalysis still showed a specific gravity of 1.010, a trace of albumin and no formed elements.

The patient became increasingly drowsy, and some bleeding occurred from the nose and mouth. Numerous infusions of 5 per cent dextrose in solution of sodium chloride were administered, as well as 5 transfusions totaling 1,250 cubic centimeters of blood. Hematologic values during this period of hospitalization revealed a range of hemoglobin from 5 to 7.5 Gm. per hundred cubic centimeters of blood and red cells from 2,700,000 to 3,600,000 per cubic millimeter. The white cells numbered 6,000 per cubic millimeter, with 4 per cent non-segmented and 78 per cent segmented polymorphonuclear leukocytes, 10 per cent lymphocytes and 2 per cent monocytes.

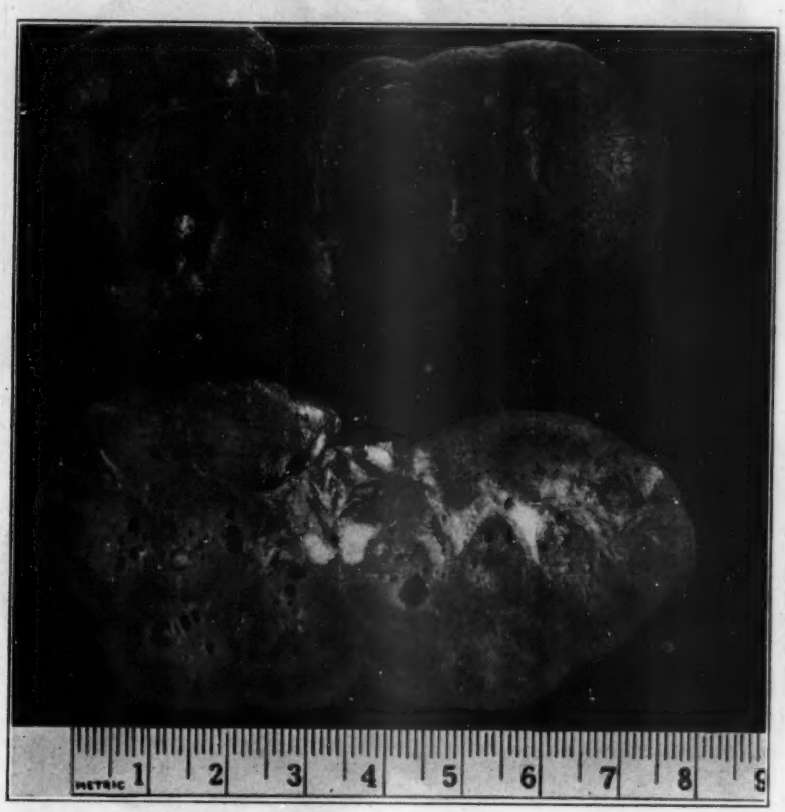

Fig. 1.—Section through one kidney showing thin cortex, indistinct corticopyramidal separation and honeycomb-g of medulla by small cysts. Note fine granular cortical surface and embryonal lobes. Approximately normal size.

dmitted on May 6 because of these symptoms as well for persistent vomiting, drowsiness and twitchings.

The dominant observation on physical examination as the extreme wasting. The blood pressure was 140 stolic and 100 diastolic. The heart was enlarged to left, and a systolic murmur was heard loudest along left sternal border. The lungs were clear. The er, spleen and kidneys were not felt. Large red coriated lesions were present over the vulva. The flexes were hypoactive. Ophthalmoscopic examina-n revealed normal eyegrounds. While the anemia was ll severe, the main problem during this hospitaliza-n was to maintain adequate intake of fluids and to ntrol vomiting.

On admission, the urea nitrogen measured 222 mg. r hundred cubic centimeters of blood, serum calcium

On the sixteenth day, vomiting and headache became intense, the patient became stuporous and twitchings of the hands and mouth occurred. Bleeding from the mouth was profuse, convulsions became generalized and therapy was futile. The patient died on May 22, 1943.

Necropsy.—The significant observations were limited to the kidneys, parathyroids, bones and bone marrow. A description of the heart is included here, because of the difficulty of appraising the clinical significance of the recurrent systolic murmur heard during life.

Inspection: The body was that of a young white girl 127 cm. long and weighing 18 Kg. The body appeared to be rather emaciated. No edema or jaundice was present. The skin contained no discolorations, ulcers or tumors, and there was a normal distribution of hair. The thorax, face and neck appeared to be

normal. The breasts were small, flat and firm. The abdomen was flat. The external genitalia were those of an immature girl. The extremities were of normal size and shape and were symmetric.

Heart: Gross examination. The heart weighed 130 Gm. and appeared to be normal in size and shape. The epicardium was smooth and contained a small amount of fat. The myocardium appeared to be slightly pale, but the color was uniformly red-brown. The four chambers were of normal size. The left ventricular wall was 7 mm. thick and the right 4 mm. The endocardium was smooth. The aortic and pulmonic valves had thin, smooth, elastic cusps. The mitral and tricuspid valves were thin, smooth and freely movable. The chordae tendineae were fine and elastic; the papillary muscles were of normal size. The circumference of the valves measured as follows: tricuspid 7 cm., mitral 5 cm., aortic 4 cm. and the pulmonic 4 cm. The foramen ovale and ductus arteriosus were closed.

Microscopic examination. The auricular endocardium was approximately 500 microns thick. The mitral valve was thin and contained no visible blood vessels. The ventricular muscle was well stained. Cross striations were plain. There was edema of the interstitium in one spot and an accumulation of cells in this area. These appeared to be mainly large histiocytes of t type called "myocardiocytes" by Anitschow. In ad tion, there were several polymorphonuclear leukocyt in the gathering. In a few other places the interstiti was edematous, and a few histiocytes were prese However, no Aschoff bodies or perivascular scarri was seen. There was no pericarditis. The corona vessels were normal.

Kidneys: Gross examination. The most interesti lesions were found in the kidneys. The right kidn weighed 60 Gm.; the left kidney, 50 Gm. The combin weight of the kidneys in children 8 years old averag 125 Gm. Tightly adherent capsules covered the fine

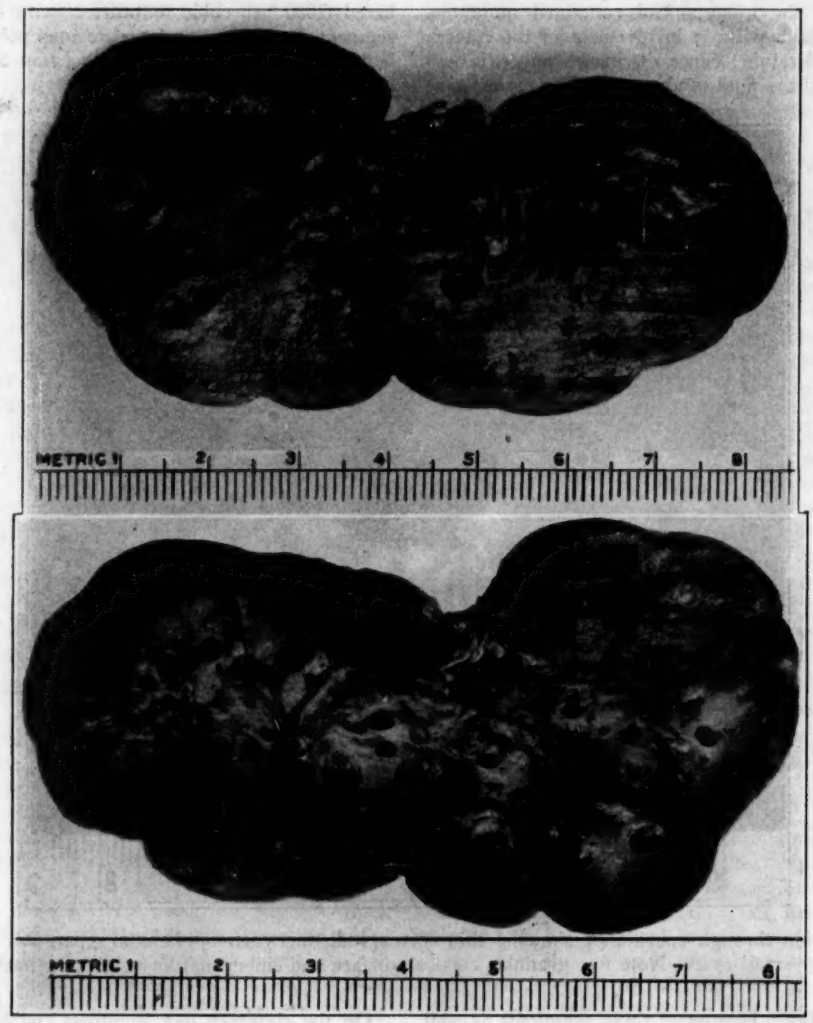

Fig. 2.—Section of both kidneys showing uninvolved cortex and sharp localization of numerous small cysts medulla. Kidneys are of approximately normal size.

granular cortical surfaces, which were divided into embryonal lobules (fig. 1). The cortex everywh was thin, averaging 2 mm. The corticopyramidal se ration was indistinct everywhere. There were numerable cysts sharply limited to the pyramids (fi 1 and 2). In only one place did a cyst appear to in the cortex. This, however, was a large cyst viously originating in the medulla and had proba caused atrophy of the overlying cortex. The major of the cysts were from 1 to 5 mm. across. The larg was about 1 cm. in diameter, and many were sma than 1 mm. The cyst walls were thin. The cysts o

ed clear, colorless, odorless fluid the viscosity of ich approached that of water. The pelvocalical tems and ureters were thin walled and undilated. lculi and evidences of inflammation were absent. ere was no obstruction at the right ureterovesical orifice and no evidences of bilateral hydroureter as suggested by the pyelograms.

Histologic examination. Microscopically there was diffuse fibrosis throughout all portions of both kidneys.

Fig. 3.—Subcapsular region of renal cortex (× 44). te glomeruli in all stages of fibrosis and large Bow- n spaces.

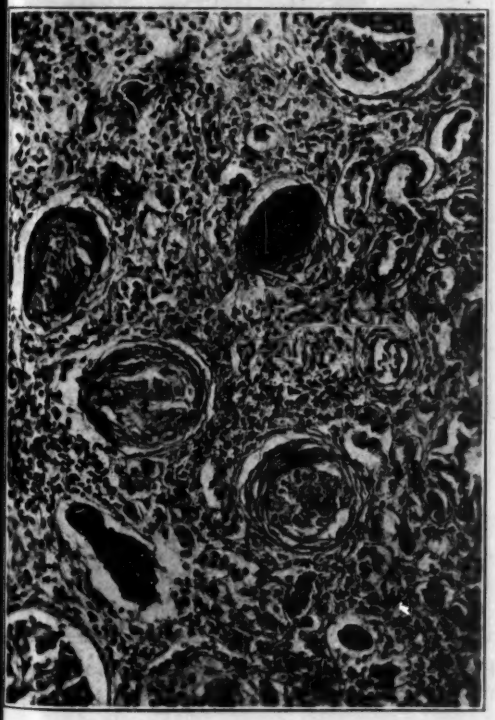

Fig. 4.—Higher magnification of renal cortex in fig- 3 (× 149), showing several glomeruli in different ges of fibrosis.

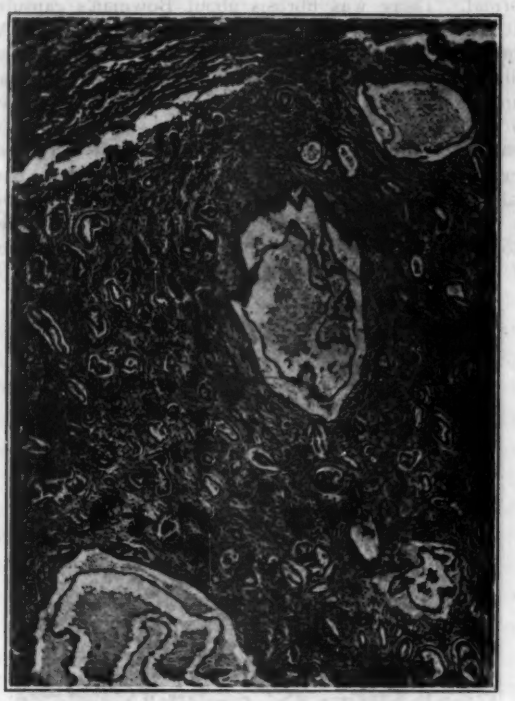

Fig. 5.—Thin-walled cysts in medulla (× 44).

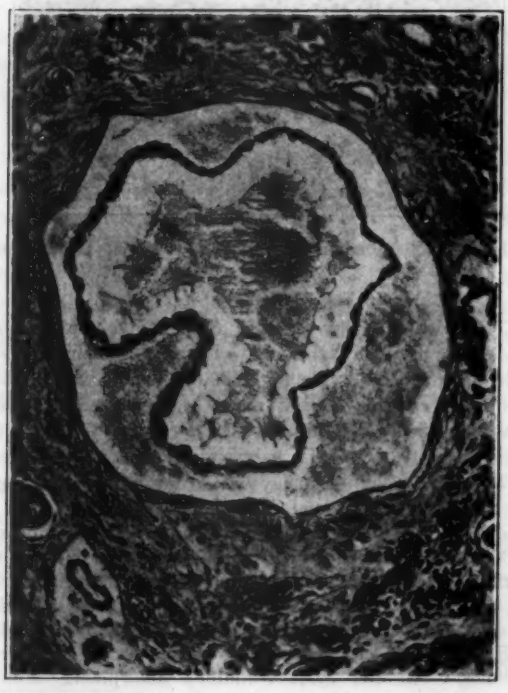

Fig. 6.—A single cyst (× 149) filled with amorphous granular faintly eosinophilic material and lined by a single layer of low cuboidal epithelium. Clear space surrounding epithelial cells in this cyst and in those of figure 5 probably represents an artefact occurring during fixation, resulting in their detachment from the basement membrane.

This was most apparent in the subcapsular portions of the cortex (figs. 3 and 4). Many lymphocytes were present in the areas of fibrosis. Most of the glomeruli were damaged. The undamaged ones were larger than normal. There was fibrosis about Bowman's capsules of approximately two thirds of the glomeruli. As fibrosis proceeded, the glomeruli shrank. However, adhesion between the glomerular tufts and the Bowman capsules did not occur until the glomeruli were reduced to shrunken, almost acellular masses. Epithelial crescents were absent. The shrunken glomeruli were converted into collagenous tissue which had become partially hyalinized. Special stains revealed no fat, amyloid or calcium in the glomerular tufts. The damaged glomeruli were most numerous in the subcapsular region of the cortex and diminished toward the medulla.

Fig. 7.—Section of parathyroid showing hyperplasia (× 149).

There was atrophy of most of the convoluted tubules and hypertrophy of the rest. Large eosinophilic casts filled many of the atrophic tubules. There was a thin collar of calcium around many of the tubules, which was deposited about the basement membranes. This was the only metastatic calcification which was found.

The thin-walled cysts lay within the pyramids among the loops of Henle and the collecting tubules (figs. 5 and 6). They were numerous; many, between 175 and 1,000 microns, were not visible in the gross. The fibrous stroma around the cysts was no denser than elsewhere in the pyramids. There was no inflammation near the cysts. They were lined by a thin layer of low cuboidal cells which closely resembled the cells of the collecting tubules. All the cysts contained amorphous, faintly eosinophilic granular material which did not take the special stains for fat, amyloid or calcium.

There was slight splitting and reduplication of the internal elastic lamellas of a few of the larger arteries. The smaller arteries and arterioles appeared to be normal. The mucosa of the pelvocalical systems was intact, and there was no inflammation present.

Parathyroid Glands: Four moderately enlarged par thyroid glands were removed and studied. The pictu was uniform in all of them. The fat cells, usua

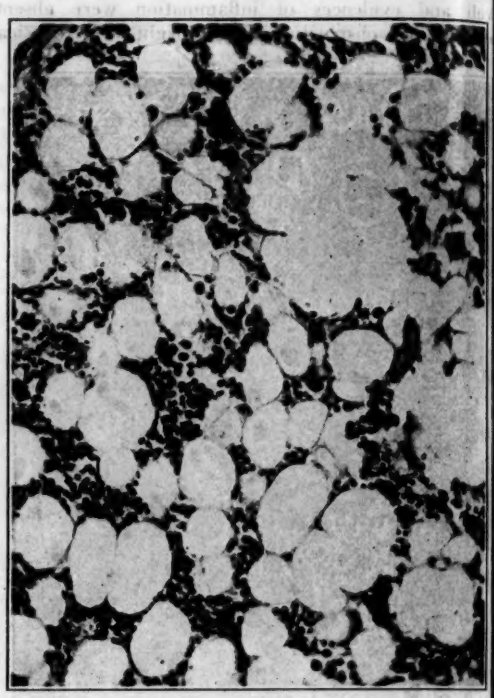

Fig. 8.—Atrophy of erythropoietic elements in bo marrow with almost complete replacement by (× 149).

Fig. 9.—Section of vertebra: absorption of verteb lamella by osteoclasts (× 149).

present among the groups of epithelial cells, were abs They were replaced by a uniform overgrowth of epith lial cells arranged in small clumps (fig. 7). Each clu

s separated from its neighbors by a thin layer of erstitial tissue. The cellular nuclei were dark and ost spherical. The cytoplasm of most of the cells s pale pink. The cytoplasm of about 1 per cent of cells was water clear.

Bone and Bone Marrow: The marrow of ribs, ster- and vertebrae was moderately and uniformly oplastic. The marrow elements were widely sepa- ed by fat cells (fig. 8). Few erythropoietic elements ld be found. Most of the small cells, with dark lei in clumps, in the marrow were lymphocytes. elopoietic elements were scarce but were more nerous than erythropoietic elements.

Deposition and reabsorption of calcium had been urring rapidly, judging from the large numbers of eoblasts and osteoclasts present near the bony lamel- in the vertebra and sternum (fig. 9). There was evidence of cysts in any of the other organs, and re were no other congenital abnormalities.

COMMENT

In a patient with a known renal lesion, sam- s of the blood and urine are examined riodically; hence development of anemia with ogression of the disease is not unexpected. In e present instance, anemia was the initial and rdinal feature of ill health. In the absence of tecedent history and of symptoms and physical ns of renal disease, investigations prior to the tient's admission to the hospital were directed ward the diagnosis and treatment of a blood scrasia. Although subsequent studies eventu- y led to the discovery of azotemia, the exis- nce of underlying renal disease might possibly ve been detected sooner by means of earlier d repeated urinalyses and determinations of ood pressure. Examinations of the urine dur- g the period of developing anemia would have vealed a minimal albuminuria but a consis- ntly low fixed specific gravity. On the first mission to the hospital determinations of blood essure were initially delayed because diag- stic procedures were directed solely to classify- g what was regarded as a primary anemia. roughout the later course of the patient's ness in the hospital, blood pressure readings re observed to fluctuate widely from approxi- ately normal to grossly abnormal levels. It is obable that had this procedure been repeated en enough earlier in the child's illness an vation of blood pressure would have been tected.

The factor of anemia in this case requires ief mention, since its close association with ronic nephritis has been extensively investi- ted.[1] With few exceptions every large series of cases reveals a parallel between the severity of anemia and the degree of nitrogen retention and of impairment of renal function. There is no evidence, however, that the anemia is produced by the accumulation of nitrogenous products in the blood, although its mechanism is usually explained on the basis of toxic depression of hemopoiesis. The anemia occurs regardless of the type of anatomic lesion responsible for the renal insufficiency, but the specific factor producing the anemia has not yet been identified and no uniform alterations have been described in the hemopoietic tissues.

Townsend, Massie and Lyons[1e] emphasized the relation between gastric hypochlorhydria or achlorhydria which they found in their cases of chronic glomerulonephritis and the development of anemia. Their observations corroborated the experimental work of others indicating that acidosis occurring in advanced renal disease is associated with decreased gastric acidity, particularly when the plasma bicarbonate is greatly reduced. They suggested therefore that certain phases of the anemia, such as the refractory response to therapy, are influenced by the improper absorption from the gastrointestinal tract of materials required for hemopoiesis. This hypothesis was strengthened when necropsy studies revealed that in the majority of their patients the costal marrow was of a normal or hyperplastic type rather than of a hypoplastic or aplastic type, as would result from depression by a toxic substance.

In many respects the present case substantiates the conclusion of these investigators, since in the patient's first admission to the hospital there was noted the coexistence of a refractory anemia, decreased gastric acidity, lowered plasma bicarbonate and normal bone marrow. Beyond this point, however, further discussion of the ultimate cause of the anemia is speculative, since no single mechanism reconciles all the data. The reticulocytes, platelets and white blood cells were not reduced, and there was no agranulocytosis. In our patient the marrow did not maintain its initial normal structure; studies at autopsy eight months later revealed that it had become atrophic. Since a severe grade of anemia was present with both normal and hypoplastic marrow, it is difficult to ascribe its causation to a depression of the hemopoietic tissues by a toxic factor. There was no evidence that the

1. (*a*) Ashe, B.: Hemoglobin Percentage and Red ood Cell Count in Bright's Disease, Myocardial ufficiency and Hypertension, Arch. Int. Med. **44:** (Oct.) 1929. (*b*) Parsons, L., and Ekola-Strolberg, : Anemia in Azotemia, Am. J. M. Sc. **185:**181 (Feb.) 3. (*c*) Townsend, S. R.; Massie, E., and Lyons, R. H.: Studies on Anemia of Chronic Glomerulonephritis and Its Relationship to Gastric Acidity, ibid. **194:**636 (Nov.) 1937. (*d*) Blum, L. L.: Hematologic Aspects of Genito-Urinary Disorders with Particular Reference to Anemias of Nephritis, Urol. & Cutan. Rev. **45:**626 (Oct.) 1941. (*e*) MacArthur, P.: Anemia in Nephritis, Arch. Dis. Childhood **17:**1 (March) 1942.

anemia was related to loss of blood, and except for an initially elevated icteric index there were no other features indicative of increased hemolysis. Although liver extract and iron were administered in adequate dosage, it is possible that their failure to be utilized resulted from the profound metabolic changes associated with severe anorexia, vomiting and wasting of the patient.

With the discovery of the azotemia, there was still no clue as to the nature of the renal lesion. Congenital polycystic disease of the kidneys is not an unusual condition, but it is seldom recognized in childhood. Far more common ages of recognition are either early infancy or adult life.[2] For older persons with progressive dilatation of the cysts, enlargement of one or both kidneys, a characteristic pyelogram and evidence of renal insufficiency, the diagnosis offers little difficulty. At any age period, however, the cysts may be small and numerous and the kidneys may not be appreciably enlarged. In such cases, polycystic disease may be suspected when there is no other definite cause of pronounced renal impairment.

In polycystic kidneys, Bell [2] pointed out, both the cortex and the medulla are usually filled with cysts so that no distinction can be made between these portions. The sharp localization of the cysts in the medulla in the present case is unique and finds its parallel in only 1 other case, reported by Stammen,[3] that of an 18 year old boy in whom such lesions were associated with cysts in the liver. In this patient, the anemia was of moderate degree and was not the outstanding feature of the disease. The reverse of such unusual cystic distribution was described by Roos [4] in an 8 month old infant with bilateral cystic disease of the kidneys in which the cortex was honeycombed with pinhead-sized cysts but the medulla was uninvolved.

The peculiar anatomic distribution of the lesions in our patient may be explained to some extent by reference to one of the current concepts of the pathogenesis of the polycystic kidney. Until the separate origin for convoluted and collecting tubules of the kidney was discovered, congenital renal cysts were regarded either as retention cysts due to occlusion of the urinary tubules by an inflammatory process, such as the result of an unregulated proliferation of stroma and epithelium, or as true new growths. With the embryologic evidence as to the dou origin of the kidney, it was generally accep that cyst formation resulted from a failure the convoluted tubules to fuse with the c lecting tubules. Reasonable as this explanati appeared, it had been succeeded by the theor resulting from the investigations of Kampmei and of Norris and Herman.[6] The segregation cysts in the medulla and their absence from cortex in the present case might be regarded strong evidence in favor of the theory that convoluted and collecting tubules had failed unite. It has been pointed out, however,[7] t metanephric blastema is not differentiated i normal glomeruli and tubules in the embr until after penetration by collecting tubul when the immature elements develop into a c tinuous system.

Kampmeier [5] and, later, McKenna and Kam meier,[8] after examining renal sections of ma embryos and fetuses of different ages, demo strated that the first three or four generati of convoluted tubules are not permanent become detached from the collecting tubules a persist for a time as cystic structures. Th suggested that, whereas these redundant cys renal tubules normally atrophy, their persiste and growth result in the development of polycystic kidney. By increased distention, th cysts may conceivably exert increasing pressu on neighboring normal tubules with further c formation. It is worthy of note that the zo adjacent to the renal pelvis in which th vestigial tubules are transformed into cysts in embryo corresponds approximately to the lo tion of the cysts in the present case.

From a section of the kidneys from 4 patien Norris and Herman [6] have recently demonstra that during a considerable period of fetal development of the kidney proceeds norma According to these authors, focal cystic dilati of uriniferous tubules and of collecting du occur after the differentiation of the metaneph genic anlage and after the union of its eleme with the collecting ducts. Slight abnormal c striction may accompany the lesions, and part obstruction of the lumens may facilitate development of the cystic dilatations. Segme of the convoluted tubules and of the collecti ducts subsequently become isolated as cysts a

2. Bell, E. T.: Cystic Disease of Kidneys, Am. J. Path. **11**:373 (May) 1935.

3. Stammen, H.: Ueber Markzystennieren, Inaug. Dissert., Giessen, O. Kindt, 1913.

4. Roos, A.: Polycystic Kidney: Report of Case Studied by Reconstruction, Am. J. Dis. Child. **61**:116 (Jan.) 1941.

5. Kampmeier, O. F.: A Hitherto Unrecogni Mode of Origin of Congenital Renal Cysts, Su Gynec. & Obst. **36**:208 (Feb.) 1923.

6. Norris, R. F., and Herman, L.: Pathogenesis Polycystic Kidneys: Reconstruction of Cystic Eleme in Four Cases, J. Urol. **46**:147 (Aug.) 1941.

7. (*a*) Bell.[2] (*b*) Norris.[6]

8. McKenna, C. M., and Kampmeier, O. F.: C sideration of Development of Polycystic Kidney, Urol. **32**:37 (July) 1934.

arged by means of continued proliferation of thelium and by rupture of septums and walls tubules to produce anastomoses and inter-mmunications. As the cysts increase in size, normal renal tissue is encroached on and troyed by pressure. They believed that these nges were abnormally degenerative as com-ed with stages in the normal degeneration of mesonephros. In polycystic kidneys, a much ater part of the metanephros is provisional n is normal. They noted that in several of ir patients localized dilatations found initially the renal tubules were present also in the ducts and pancreatic ducts. The argument the fetal origin of polycystic kidney is engthened by the known association of this dition with cysts in other organs and by a iety of congenital anomalies.

While the sequence of events as outlined by h groups of investigators rests on a more stantial basis than that of previous theories, fundamental causative factors involved in l cyst formation are still unknown. Kamp-ier [5] proposed the existence of a factor which trols normal degeneration and suppression of undant structures, while Norris and Herman [6] tulated the influence of a defect in the germ sm. The evidence for both concepts is in-ct and is based on the frequent association of ycystic kidneys with more widespread angements in the same person, such as cysts other organs and a variety of congenital malies. In the present patient, however, the ts were limited entirely to the kidney and re were no other congenital abnormalities.

The curious type of change noted in the meruli partially substantiates the theory of reased intratubular pressure produced by growth and expansion of the medullary cysts represents, in effect, an intrarenal hydrone-rosis. Both pericapsular fibrosis and fibrosis the glomerular tufts appear to have started ly in the process. Adhesion between tufts and sules, however, did not occur until the meruli were greatly shrunken and almost llular. It was demonstrated by frozen sec-ns that a large Bowman space was present und almost all the glomeruli. It is suggested the medullary cysts, through pressure on acent tubules, were responsible for a rise in atubular pressure. This pressure did not ch filtration pressure but was sufficiently great keep Bowman's space open and thus prevent -capsule adhesion. The stimulus of this con-tly increased pressure might have served to duce fibrosis of the glomerular tuft and fibrosis und Bowman's capsule. With the cessation of ation due to tuft fibrosis and the subsequent p in intratubular pressure, constriction of the capsule might have occurred, with eventual tuft-capsule adhesion.

The enlargement of parathyroids observed in this case is known to occur in cases of chronic renal insufficiency and is regarded as a compensatory mechanism in response to phosphorus retention and depression of the calcium in the serum, both of which were observed in later stages of the patient's illness. The collar of calcium around some of the renal tubules represented the only manifestation of metastatic calcification. There were no other manifestations of renal rickets. There were no skeletal deformities; the height was within normal range, and there was no roentgenographic evidence of osteoporosis.

SUMMARY

Investigation of the cause of a prolonged and severe refractory anemia in a child of 8 years led to the discovery of decided and unexpected azotemia. This nitrogen retention later proved to be accompanied with other evidences of renal impairment such as reduced excretion of phenolsulfonphthalein, low urea clearance, acidosis and eventually hyperphosphatemia and hypocalcemia. The urinary abnormalities consisted only of minimal albuminuria and a consistently low fixed specific gravity, and pyelography threw no light on the nature of the renal lesion. Blood pressure readings fluctuated widely from approximately normal to greatly elevated levels. There was no edema and there were no retinal changes. At necropsy kidneys of normal size were found in which numerous cysts were present. These honeycombed the medulla but were absent from the cortex. Considerable glomerular fibrosis was present and was explained on the basis of an intrarenal hydronephrosis resulting from increased intratubular pressure by the expanding medullary cysts.

Hyperplasia of the parathyroid, presumably compensatory in nature, and hypoplasia of the bone marrow were also noted. Metastatic calcification was represented by a collar of calcium around some of the renal tubules. There were no cysts in other organs and no other congenital abnormalities. No other members of the family were known to have had polycystic kidneys.

The location of the cysts corresponds most closely to the site of embryonic cyst formation according to the mode of origin described by Kampmeier. Anemia is known to accompany chronic nephritis regardless of the type of anatomic lesion responsible for the renal insufficiency. Whether the early onset and unusual severity of the anemia in this case were related to the peculiar distribution of the cysts can be determined only by reports of similar cases.

Abstracts from Current Literature

Biochemistry; Bacteriology, and Pathology

PRESERVATION OF CLASSIC RICKETTSIA PROWAZEKI IN THE LUNGS OF MICE AFTER 74 CONSECUTIVE TRANSFERS. M. RUIZ CASTANEDA and ROBERTO SILVA G., J. Infect. Dis. **75**:103 (Sept.-Oct.) 1944.

Two strains of typhus virus have been passed in the lungs of mice to the sixty-eighth and seventy-fourth transfers by intranasal inoculation. The virus retained its original serologic and immunologic properties.

Overgrowth of invaders was prevented when sterile sulfathiazole was added to the ground mouse lung.

TOOMEY, Cleveland.

REPORT ON SIX STRAINS OF SHIGELLA PARADYSENTERIAE TYPE P274 ISOLATED FROM CASES OF DYSENTERY IN GEORGIA. JANIE F. MORRIS, ALICE BRIM, T. F. SELLERS and R. F. PAYNE, J. Infect. Dis. **75**: 106 (Sept.-Oct.) 1944.

Shigella paradysenteriae, type P274 (Boyd), was isolated from each of a family group of 5 patients ill with clinical dysentery and from 1 unrelated patient. The cultural, biochemical and serologic characters of these six strains are described.

The results may indicate that strain P274 is more common in the United States than was heretofore suspected. Likewise, the possibility of its importation from India and other infected areas should be considered.

TOOMEY, Cleveland.

USE OF THE YOLK SAC OF THE DEVELOPING CHICKEN EMBRYO IN THE ISOLATION OF THE AGENT OF LYMPHOGRANULOMA VENEREUM. MORRIS F. SHAFFER, HELEN JONES, ARTHUR W. GRACE, DOROTHY M. HAMRE and GEOFFREY RAKE, J. Infect. Dis. **75**: 109 (Sept.-Oct.) 1944.

Two strains of the agent of lymphogranuloma venereum were isolated by inoculation of suspensions of pus from inguinal buboes directly into the yolk sacs of embryonated chicken eggs.

In all ways, particularly with regard to susceptibility to sulfonamide compounds, tissue tropisms and type of endotoxin produced, these strains isolated by the yolk sac technic resemble the other strains of the agent of lymphogranuloma venereum with which the authors worked; in the last three characteristics they differ from strains of all other members of this group.

TOOMEY, Cleveland.

A STUDY OF THE PARA-AMINOBENZOIC ACID REQUIREMENT OF CLOSTRIDIUM ACETOBUTYLICUM: APPLICATION TO ASSAY PROCEDURE. RILEY D. HOUSEWRIGHT and STEWART A. KOSER, J. Infect. Dis. **75**:113 (Sept.-Oct.) 1944.

Conditions have been described by which turbidity and acid production of Clostridium acetobutylicum can be correlated with the paraaminobenzoic acid content of the medium. Quantities of paraaminobenzoic acid as low as 0.00004 micrograms per cubic centimeter may be detected by this method.

Growth of the organism in aerobic tubes was secured by use of certain reducing agents and agar, but this method was not as satisfactory as the use of anaero jars for estimating accurately the amounts of growth relation to added paraaminobenzoic acid. Factors fo in agar, extractable in alcohol and pyridine, suppor growth of the test organism in the absence of bio and paraaminobenzoic acid.

Detailed studies have been made on both specific nonspecific factors affecting growth and metabolism the test organism. The activity of fifteen compou structurally related to paraaminobenzoic acid studied.

A sulfonamide-resistant Staphylococcus aureus p duced from ten to one hundred times the amount paraaminobenzoic acid produced by its parent (n resistant) strain. The paraaminobenzoic acid synthe of this organism may be increased by lengthening incubation period or by increasing its resistance sulfonamide compounds through continued exposure increasing amounts of the drug.

A sulfonamide-resistant pneumococcus and a sulf amide-resistant dysentery bacillus did not show increa synthesis of paraaminobenzoic acid as compared w the original nonresistant strains. These results confi those of Landy and associates with Acetobacter s oxydans as the test organism.

TOOMEY, Clevelan

THE ISOLATION OF THREE NEUROTROPIC VIRUSES FR FOREST MOSQUITOES IN EASTERN COLOMBIA. MAN ROCA-GARCIA, J. Infect. Dis. **75**:160 (Sept.-O 1944.

Three infectious agents pathogenic for white mice intracerebral inoculation were isolated from wild-cau mosquitoes in Eastern Colombia; two from groups Anopheles boliviensis and one from a group of Wy myia melanocephala.

These agents were considered to be filtrable viru because they retained virulence after passage throu Seitz and Berkefeld filters and because attempts culture micro-organisms from the infectious mate were unsuccessful.

The viruses were provisionally named Anopheles Anopheles B and Wyeomyia, according to their m quito origin.

Anopheles A and Wyeomyia viruses could be p served by drying mouse brain suspensions in the fro state, and the infectiousness of Anopheles B virus mouse brains was retained by preservation in 50 cent glycerin at refrigerator temperatures.

All three viruses were fatal to white mice on int cerebral inoculation and could be maintained by se passage in mouse brains. The viruses were also fectious by intranasal inoculation but not by intrape toneal or subcutaneous inoculation in adult mice. De of the mice was preceded by paralysis of the poster quarters after infection with Anopheles A or Wyeom virus, but the paralytic symptoms were not pronoun after infection with Anopheles B virus.

Anopheles A and Wyeomyia viruses were infecti for baby mice on subcutaneous inoculation, but A pheles B virus was not.

The virus could invariably be recovered from brain and spinal cord of sick mice. The Wyeom virus was also recovered from the adrenals, liver, spl lungs and heart of sick mice infected by intracereb inoculation; Anopheles A virus showed a more limi

stribution, being recovered only from the adrenals. no case was virus found in circulation after the third y following inoculation.

Adult mice inoculated intraperitoneally or subcuneously with any of the three viruses showed subsecent resistance to infection by intracerebral inoculation ith the same virus. None of the three viruses proced immunity to Theiler's mouse encephalomyelitis rus.

Experiments with various laboratory animals and a w species of local mammals are discussed. There as no clinical disease produced in any of the animals died. Anopheles A virus was recovered once from rhesus monkey and from 3 to 15 guinea pigs. The stinoculation serums of some animals, notably opossms, showed protective power in neutralization tests. Anopheles A virus could be maintained by serial ssage in chick embryos; Anopheles A and B viruses uld be maintained by serial passage in tissue cultures minced mouse embryos in Tyrode's solution.

Neutralization tests showed that all three viruses re immunologically distinct from yellow fever virus. eutralization tests using Anopheles A virus and imne serums for eastern and western equine encephaloelitis, St. Louis encephalitis, Japanese B virus, West le virus and distemper virus also gave negative results.

TOOMEY, Cleveland.

Metabolism; Infant Feeding Milk and Other Foods

GESTIBILITY AND BIOLOGICAL VALUE OF SOYBEAN PROTEIN IN WHOLE SOYBEANS, SOYBEAN FLOUR AND SOYBEAN MILK. WILLIAM M. CAHILL, LAWRENCE J. SCHROEDER and ARTHUR H. SMITH, J. Nutrition **28**:209 (Sept.) 1944.

Cahill, Schroeder and Smith, using adult human bjects, found the average true digestibility of the otein in cooked whole soybeans to be 90.5 per cent; cooked soybean flour, 94.0 per cent, and in soybean lk, 89.6 per cent. The average biologic values of the rogen of the three products for maintenance in adult man subjects were: 94.5 per cent for the protein in whole cooked soybeans; 91.7 per cent for the cooked ur, and 95.3 per cent for the milk. Nitrogen balances re less favorable, because of the greater loss of soyan nitrogen in the feces.

FREDEEN, Kansas City, Mo.

OBABLE CASE OF CONGENITAL SCURVY. A. CASTELLANOS, R. PEREIRAS and A. GARCIA LOPEZ, Arch. de med. inf. **13**:202 (July-Sept.) 1944.

The authors present the case of a baby born with an hymotic swelling of the right thigh, who was exined at the hospital fifteen days after birth. Roentologic studies revealed a subperiosteal hematoma the lower portion of the right femur and a small one the left. There were no significant abnormalities in er bones. In the differential diagnosis birth injuries, lignant tumors, syphilis and rickets were considered. The ascorbic acid level in the mother was very low, 5 mg. per hundred cubic centimeters. Unfortunately, level in the patient was determined after injection 200 mg. of ascorbic acid. Even then the level was y 0.86 mg. The hematoma was rapidly reabsorbed er injections of ascorbic acid.

The mother had a deficient diet during pregnancy and had little of orange juice during the last two nths preceding delivery; she had had five spontaneous rtions previously.

A review of cases of congenital scurvy is made, and an extensive roentgenologic study of the disease is presented.

BRIBIESCA, Mexico.

Vitamins; Avitaminoses

EFFECT OF RIBOFLAVIN DEFICIENCY ON THE COURSE OF PLASMODIUM LOPHURAE INFECTION IN CHICKS. ALBERT O. SEELER and WALTHER H. OTT, J. Infect. Dis. **75**:175 (Sept.-Oct.) 1944.

Riboflavin deficiency exerted a decided influence on the course of Plasmodium lophurae infections in chicks. In contrast to biotin deficiency, however, riboflavin deficiency decreased the severity of the acute infection as judged by parasite counts. The administration of riboflavin to deficient birds during the course of the infection increased the severity of the infection. Chicks receiving an adequate amount of riboflavin but whose food intake was restricted to half that of a control group had an even heavier infection than did the controls. The reduced parasite count was therefore specifically due to the lack of the vitamin rather than to the lowered consumption of other dietary factors. While the deficiency decreased the parasitemia in P. lophurae infection in chicks, the addition of an excess amount of riboflavin to a diet already adequately supplied with the vitamin had no effect on the disease.

The mortality was relatively high in the deficient groups, in spite of the fact that the parasite counts for these groups were much lower than for the birds receiving an adequate amount of riboflavin. This increase in mortality was due principally to the inanition associated with the riboflavin deficiency.

TOOMEY, Cleveland.

FURTHER STUDIES ON THE VITAMIN C METABOLISM OF PRESCHOOL CHILDREN. FRIEDA L. MEYER and MILICENT L. HATHAWAY, J. Nutrition **28**:93 (Aug.) 1944.

Meyer and Hathaway found that a daily intake of 23 to 25 mg. of ascorbic acid was not sufficient to maintain tissue saturation in the 8 preschool children studied. With the addition of 3.38 Gm. of potassium citrate to the diet, "utilization" of ascorbic acid was increased in 5 of 8 children at both levels of ascorbic acid intake (25 and 125 mg.), and in 2 others at the higher level of ascorbic acid intake. There was a significant increase in the "utilization" of ascorbic acid in 4 children studied when orange juice was the source of the vitamin. Urinary p_H apparently played no part in the utilization of ascorbic acid.

FREDEEN, Kansas City, Mo.

VITAMIN P: OBSERVATIONS ON THE CAPILLARY RESISTANCE IN TWO CASES OF SCURVY. HAROLD SCARBOROUGH, Edinburgh M. J. **51**:381 (Sept.) 1944.

From observations at the clinical laboratories of the Royal Infirmary in Edinburgh, the author reports 2 cases of scurvy in adults from the standpoint of capillary resistance, studied for periods of fifty-two to sixty days. Hesperidin and a preparation obtained from rose hips produced a rapid increase in the capillary resistance following treatment with ascorbic acid. The author states that the minimum daily requirement of vitamin P to keep the resistance at a high level is from 300 to 500 provisional units, and this strengthens the findings of Szent Györgyi, who designated the substance as vitamin P.

NEFF, Kansas City, Mo.

A Study of Vitamin C Saturation in Hospital Children. D. H. Wallace and Pepi Adler Tanz, Glasgow M. J. **24**:55 (Sept.) 1944.

Frank scurvy was rare among the patients studied, but many children were defective in storage of ascorbic acid. The authors believe that infections reduce stores of ascorbic acid.

Snelling, Toronto, Canada.

Vitamin D Resistant Rickets. C. Ruiz, Arch. argent. de pediat. **22**:54 (July) 1944.

A short summary of the facts about intestinal, hepatic and renal rickets with particular regard to the pathogenesis of these conditions, is given. Cases of vitamin D–resistant rickets reported in the literature since 1938 are mentioned.

The author feels that the assumption of parathyroid hyperactivity resulting in phosphaturia and hypophosphatemia might be related to this picture. The indications for "massive therapy" in rickets are commented on.

Cassorla, Chicago.

Prematurity and Congenital Deformities

The Care of Cleft Palate in Babies. Louis W. Schultz, Illinois M. J. **86**:138 (Sept.) 1944.

This is a treatise on cleft lip and palate in babies, discussing the etiology, varieties, complications, time for treatment, anesthetics, surgical repair, care and prognosis. It is too comprehensive and detailed for adequate abstracting.

Barbour, Peoria, Ill.

The Influence of Blood Transfusions on the Hemoglobin and Erythrocytes in Premature Newborn Infants. D. Winocur, Arch. argent. de pediat. **22**:39 (July) 1944.

Nine newborn infants were treated with blood transfusions, repeated from two to nine times. The transfusions failed to check the well known drop of hemoglobin level during the first two months.

No influence was apparent on the rate of improvement which spontaneously follows the first period.

Cassorla, Chicago.

Newborn

Rh Antigen: Its Clinical Importance. C. Weiss, California & West. Med. **60**:59 (Feb.) 1944.

Weiss describes the treatment of babies with fetal erythroblastosis, employing Rh-negative blood of the homologous type. Several transfusions may be required and several months may elapse before the blood picture becomes normal. Data are also presented which illustrate the role of the agglutinogen Rh as a cause of certain types of transfusion reactions. Weiss makes the following recommendations: 1. Tests for the Rh antigen should be made routinely on the blood of all newborn babies with anemia, jaundice or hydrops fetalis; on all women with toxemias of pregnancy, repeated miscarriages or neonatal deaths, and, if possible, on all women who are pregnant or who contemplate pregnancy, as well as on all persons, male or female, who are to have repeated transfusions. 2. Every community should have access to a panel of donors belonging to each of the four blood groups whose erythrocytes lack the Rh antigen (Rh—). 3. Blood counts and differential smears should be made from the cord blood of all newborn babies in order to be on the alert for the existence erythroblastosis neonatorum.

Pryor, Stanford University, Calif.

Incidence of Haemolytic Disease of the Foetus Different Families. K. E. Boorman, B. E. Do and P. L. Mollison, J. Obst. & Gynaec. Brit. E **51**:1 (Feb.) 1944.

It is now generally accepted that hemolytic disease the fetus (erythroblastosis fetalis) is due to the acti on the fetal erythrocytes of immune agglutinins form in the mother's serum during pregnancy and pass through the placenta into the fetal circulation.

Boorman, Dodd and Mollison, in an attempt to ass the value of Rh typing in diagnosis and prognosis, test three series of patients. One hundred families w tested because of the birth of a fetus suspected of havi hemolytic disease. Another series (70 subjects) w composed of women who had given birth to one more stillborn fetuses. In a third series (60 cas in which the infant was thought to have physiolo jaundice, the mothers and the infants were tested. Al a group of normal mothers and infants were tested order to obtain control material. The authors dr the following conclusions:

1. When the infant is suspected of having hemoly disease, the presence in the mother's serum of immu atypical agglutinins can be accepted as almost conc sive evidence of the disease.

2. Failure to find the immune agglutinins in t mother's serum does not exclude the diagnosis, especia if the serum is not examined within about twenty da after delivery.

3. The mere demonstration that the infant (or fathe has Rh-positive serum and the mother Rh-negati serum is only suggestive evidence of the disease.

4. The demonstration that the mother's serum is positive does not exclude the diagnosis.

5. These serologic tests are of value as a routine women of child-bearing age (*a*) to detect persons w Rh-negative serum so as to insure that they do n receive transfusions of Rh-positive blood and (*b*) detect anti-Rh agglutinins in the serums of women w Rh-negative blood so that, in anticipation of the bi of an affected child, proper facilities for its early tre ment with transfusions of Rh-negative blood may made.

Cummings, Evanston, Ill.

Acute Contagious Diseases

Sulfadiazine and Its Sodium Compound in Trea ment of Meningococcic Meningitis and Meni gococcemia. Emanuel Applebaum and Ja Nelson, Am. J. M. Sc. **207**:492 (April) 1944.

Method of treatment and dosage: In general, on first day of treatment children under 1 year of a received from 2 to 3 Gm. of the drug; children fr 1 to 3 years of age, from 3 to 4 Gm.; children abo that age, from 4 to 7 Gm., and adults, from 9 to Gm. One fourth to one third this amount was giv as an initial dose and the remainder divided and admi istered at intervals of four hours. In 89 cases drug was given by vein during the first twelve twenty-four hours, as a rule in a 5 per cent solut in distilled water. In cases of very severe illness parenteral medication was continued for a longer peri In the remaining cases the drug was administer orally from the start. The authors found that w

exceptions the disease was well controlled and emotherapy could be safely discontinued when the ient showed a decided improvement in the mental te, had been essentially afebrile for twenty-four to ty-eight hours and had received a total of 15 to Gm. of the drug.

The rapidity with which most of the serious symp- ns disappeared was little short of astounding. Of 141 patients with meningitis, 139 recovered and 2 d, a mortality of 1.4 per cent. The 8 patients with ningococcemia but without meningeal involvement o recovered.

There were relatively few complications in this ies. The most common of these was arthritis, which urred in 15 cases.

Toxic reactions were encountered in 42 cases, in 10 which there was more than one untoward effect. e most common of these toxic reactions were related the urinary tract. The second most important toxic ct was drug fever, which usually occurred as early twenty-four to forty-eight hours after the institution chemotherapy. The authors encountered 4 cases of ephalopathy resulting from sulfadiazine intoxication this series. There were also 2 instances of periph- l neuropathy following intoxication with this drug. miorbilliform cutaneous eruption was noted in 3 cases l was associated in each instance with a slight rise temperature. With the exception of the peripheral ropathies, all the toxic reactions cleared up rapidly r the withdrawal of the drug and the institution of edial measures.

n cases of apparent failure of response to sulfon- ide drugs use of the specific horse serum has not, the authors' experience, produced any striking effect. most of the cases in which chemotherapeutic failure s reported the actual condition was an intoxication, n the result of overtreatment. The authors were vinced that, except in cases of the fulminating form of a severe associated disease, no patient with menin- coccic meningitis or meningococcemia should fail to pond to properly administered chemotherapy

HENSKE, Omaha.

HOOPING COUGH: SKIN TESTS. N. SILVERTHORNE, D. T. FRASER and A. BROWN, Canad. M. A. J. **50:** 129 (Feb.) 1944.

The skin tests for pertussis as outlined by Strean re made on a group of 120 children. The conclusions re that the skin test for pertussis as carried out ording to directions by Strean appear to be non- cific in distinguishing between a person who has had ooping cough and one who has not had the disease. is in no way comparable to the Schick test for itheria.

MOORE, Omaha.

E USE OF PROSTIGMINE AND A MODIFIED KENNY TECHNIQUE IN THE TREATMENT OF POLIOMYELITIS. GEORGE J. BOINES, J. Pediat. **25:**414 (Nov.) 1944.

n the introduction it is emphasized that clinical re- rch has produced few valuable results which can be lied to this disease. A great deal of energy, money time has, however, been expended in experimenting h various physical means designed to limit as much possible the paralytic end results. The Kenny method riefly discussed, as are the use of foments for treat- nt of the spasm and the subsequent introduction of generally known concepts of mental alienation and ordination.

he Kenny method, or a modification thereof, was d by the author in the treatment of poliomyelitis. The modification consisted in substitution of neostigmine bromide and/or neostigmine methylsulfate, administered orally and parenterally, for hot packs. No change was made in the procedure for muscle reeducation outlined by Kenny. Twenty-one cases form the basis of this report; 7 are reported in detail. Four patients had acute, 2 subacute and 15 chronic forms of the disease. Most of the patients were under 16 years of age.

The dose of drug varies according to the age and the severity of the disease. The average dose of neostigmine methylsulfate is 0.5 mg., with 1/150 grain (0.4 mg.) of atropine sulfate administered hypodermically three times a day. The atropine may be omitted or varied in amount, depending on the side effects produced by the neostigmine; these may be abdominal cramps, nausea, occasional vomiting, diarrhea and nervousness. It is true, however, that the drug is well tolerated and the side effects minimal. The oral dose of neostigmine bromide is 30 mg. four times a day; it is usually given without atropine. Administration of the drug is continued until complete relaxation is obtained. The time required varied for the patients studied from ten to one hundred and twelve days. The amount of drug given was from 450 to 7,650 mg. of neostigmine bromide administered orally and from 2.5 to 55 mg. of neostigmine methylsulfate administered hypodermically. Administration of the drug was started immediately on the patient's admission to the hospital in the acute stage of the disease. In the patients with subacute poliomyelitis the disease was of one to two months' duration; the patients with chronic poliomyelitis were under other types of treatment four to thirty-four months before the drug therapy was instituted. One child was in a bilateral half shell cast for four months. Five of the patients with chronic poliomyelitis wore braces; 3 of these wore bilateral hip or leg braces, and 2 wore a single thigh brace. All of the braces were discarded. Crutches were replaced with sticks by 1 patient and were discarded by another. Excellent recovery was noted, in practically all of the patients treated.

It is suggested that patients with poliomyelitis be admitted to the hospital for a brief period in order that the extent of the disease may be observed. Patients with severe bulbar poliomyelitis would have to be hospitalized for a longer period. It is estimated that at least 75 per cent of the patients can be adequately cared for at home by the modified Kenny technic with administration of neostigmine and instruction in muscle reeducation by a technician specially trained in the Kenny technic.

Electrocardiograms taken before and after administration of neostigmine do not demonstrate any cardiac changes. There are no clinical signs of myocardial lesions developing in any of the patients after the use of the drug.

The method described merits more extensive application in an effort to make the treatment of poliomyelitis simpler, less costly and more effective not only for patients in the acute stage of the disease but for patients with chronic poliomyelitis who are apparently paralyzed.

AUTHOR'S SUMMARY.

THE DEGREE, THE EXTENT AND THE MECHANISM OF MUSCLE SPASM IN INFANTILE PARALYSIS. H. D. BOUMAN and R. P. SCHWARTZ, New York State J. Med. **44:**147 (Jan. 15) 1944.

Spasticity is a general phenomenon in the early stages of poliomyelitis. It is independent of muscle weakening. Spasticity of a certain muscle is not automatically followed by weakening of its antagonist. Spasticity and

weakening are separate phenomena which depend on disturbance of specific functions of the anterior horn cells. Recent physiologic findings indicate that spasm associated with poliomyelitis may be explained by a decrease in the excitability of the motor neurons. Only when they lose their excitability completely does all evidence of voluntary function disappear, and with it disappears the last remnant of spasticity. Muscle spasm is much more widespread through the voluntary musculature in the acute stage of poliomyelitis than Kenny originally believed. The spasm is not always detectable by clinical methods of examination but is revealed in action current records.

AIKMAN, Rochester, N. Y.

PRESENT STATE OF TREATMENT OF SCARLET FEVER. L. J. GAUTHIER, Union méd. du Canada **72**:906 (Aug.) 1943.

Gauthier summarizes the present trend of treatment of scarlet fever. Rest in bed should be continued three weeks, with gradual return to full activity through an additional two weeks. During the first ten days milk and fruit juices comprise the diet, after which other foods are added if there is no albuminuria.

Gargles are forbidden because of the danger of initiating otitis media, but nose drops containing sulfathiazole, and even oily drops, are allowed. Scarlet fever antitoxin is used for severe forms of the disease. Sulfonamide compounds are valuable in preventing septic complications but seem to have no effect against toxic complications.

Antitoxin or sulfonamide drugs may be used for immunization of contacts. The use of preventive immunization is rather in disfavor at present.

DAFFINEE, Melrose, Mass.

PRECIPITATION OF ANTITYPHUS SERUM BY THE URINE OF PATIENTS WITH TYPHUS. A. P. LEON, Bol. Soc. cubana de pediat. **16**:107 (March) 1944.

The author has attempted to develop a new laboratory procedure as an aid in the early diagnosis of typhus. He studied 65 patients with typhus, 13 patients with other febrile conditions and 34 normal persons. He makes the following suggestions:

1. In the urine of patients with typhus are present antigenic or haptenic bodies which precipitate and fix the antibodies of antityphus serum, human or rabbit. These substances appear before the fifth day of the illness and persist until convalescence.

2. The reactions appear to be highly specific, fixation being more so than precipitation.

3. Rabbit serum is preferable to human serum and a twenty-four hour specimen of urine to a single specimen.

4. If the present results are confirmed, the method permits establishment of the diagnosis before the occurrence of the Weil-Felix reaction.

KEITH, Rochester, Minn.

RECENT OPINIONS ON INFANTILE PARALYSIS. V. ESCARDO y ANAYA, Bol. Inst. internac. am. de protec. a la infancia **18**:271 (June) 1944.

The author of this article summarizes a compilation of studies reported in the more recent publications of the National Foundation for Infantile Paralysis. The modern opinion, affirming the existence of filtrable viruses, accepts as possible the combination of virus and intestinal toxins. The hypothesis that the disease enters by the intestine is becoming each day more wide accepted. From the intestine the virus enters the ne vous system. The most common source of contagion feces, because of the great amount of virus found them. Flies and other insects seem to have a possib role in the epidemic spread of poliomyelitis.

The electric currents of muscle tend to demonstra that spasticity takes place not only in the mus shocked by poliomyelitis but in the normal one. T diagnosis of the disease is still difficult, especially relation to other neurotropic diseases. Prophylaxis directed in accordance with the modern opinion th poliomyelitis is spread by means of feces, as are typho and dysentery. For this reason, the problem of carri is important.

Because of the protean characteristics of the disea no one treatment is considered entirely satisfacto The various schools, the physical therapeutists, t orthopedists and the partisans of the Kenny meth maintain their points of view. The Kenny method now being studied from a medical and scientific stan point. Serum therapy and chemotherapy are of doubt value.

In general, the classic concept of the disease, fr the immunologic point of view, has not changed.

EDITOR'S SUMMARY.

Diseases of Blood, Heart and Blood Vessels and Spleen

LEUKÆMIA AND PREGNANCY. A. B. HACHMAN, J. Ob & Gynaec. Brit. Emp. **51**:231 (June) 1944.

Pregnancy is rare in cases of chronic leukemia a is often interrupted before term; only 75 cases ha been reported. Pregnancy has no aggravating eff on leukemia. Children born of leukemic mothers a normal. Two cases of leukemia complicated by pre nancy are reported.

CUMMINGS, Evanston, Ill.

Diseases of Lungs, Pleura and Mediastinu

PREGNANCY ASSOCIATED WITH CONGENITAL CYSTIC D EASE OF THE LUNG. J. PRESTON MAXWELL, J. Ob & Gynaec. Brit. Emp. **51**:42 (Feb.) 1944.

Maxwell presents the case history of a 24 year o woman with congenital cystic disease of the lung w was carried successfully through pregnancy and livered of a normal baby by cesarean section. Th disease is rare, especially in association with pregnan The author, after a thorough search of the literatu could find only 2 similar cases reported.

CUMMINGS, Evanston, Ill.

Diseases of the Gastrointestinal Tract, Liver and Peritoneum

LIVER NECROSIS IN BURNS TREATED WITH TANN ACID. A. V. JACKSON, M. J. Australia **2**:352 (Se 30) 1944.

The livers of 8 patients dying from burns were exa ined. In 2, from patients treated with tannic acid a silver nitrate, extensive hepatic necrosis was found. livers from patients whose burns were not treated tannic acid, cloudy swelling was the only abnormal found.

GONCE, Madison, Wis.

E LENGTH OF THE SMALL INTESTINE. J. B. CLELAND, M. J. Australia **2**:359 (Sept. 30) 1944.

The author states that the length of the small intestine over 100 bodies was found to be extremely variable, ging from 13 feet (396 cm.) (in 2 instances) to 37 (1128 cm.). The length did not seem to bear any inite relationship to the length or size of the subject. n a child may have a small intestine longer than of some adults; the small intestine measured 28 (853 cm.) in a 14 year old boy and as much as feet 4 inches (493 cm.) in a 9 week old infant.

GONCE, Madison, Wis.

CUSSION ON PARENTERAL DIARRHOEA. T. F. MCNAIR SCOTT, Proc. Roy. Soc. Med. **37**:479 (July) 1944.

arenteral diarrhea connotes diarrhea associated with ction outside the alimentary tract. No definite nologic changes in the intestine itself can be found. as always been a major problem, particularly in the two years of life. In the early part of the century as the leading cause of death of children under 2 rs. Contaminated milk and poor hygiene, especially ng the summer months, proved the chief factors in causation. Two major causes are mentioned: (1) ific infection with intestinal pathogenic organisms rotozoa and (2) associated parenteral infection. n 1925 Marriott pointed out the association of diar- with infection elsewhere in the body, especially in upper respiratory tract.

he common association of parenteral infection with rhea, even if not causative, leads to serious thera- ic problems, which the author considers fully under heads of (1) diagnosis, (2) isolation and (3) treat- t. Drs. William Gunn, Patria Gairdner, C. H. rewes, M. Mitman and A. H. Gale also discuss the lem.

WILLIAMSON, New Orleans.

TRIC TUMOR IN A TEN YEAR OLD GIRL. A. CASAUON, J. E. RIVAROLA and S. COSSOY, Arch. argent. de ediat. **22**:222 (Sept.) 1944.

he condition of a 10 year old girl showing a picture acterized by sudden onset, epigastric pain, hema- sis and melena was diagnosed as gastric tumor and operation was performed. Diagnosis was based ly on the clinical signs and roentgenologic films. hour glass-shaped tumor was found near the rus, and both the endogastric and the exogastric on were removed. The patient made an uneventful very. No histopathologic studies were performed. he authors believe that the tumor was benign because s lack of infiltration and of lymphatic involvement. ddition, the patient apparently made a permanent very, for she was operated on in February 1941. short survey of the literature is given, with par- r emphasis on pathology and diagnosis.

CASSORLA, Chicago.

Nervous Diseases

TROENCEPHALOGRAPHIC STUDIES IMMEDIATELY FOLOWING HEAD INJURIES. ROBERT J. DOW, GEORGE LETT and JOHN REEF, Am. J. Psychiat. **101**:174 Sept.) 1944.

ither the physiologic basis nor the pathologic im- ions of cerebral concussion have yet been estab- l. Various definitions have been offered, but none describe the changes which occur, if they do occur, in the condition vaguely so designated.

The study here recorded was carried on in the Kaiser Oregon Shipbuilding Corporation and includes observations on a series of 197 patients who suffered head injuries of a mild nature. The electroencephalographic tracings were all made from within ten minutes to a few hours after the injury. The ages of the patients varied from 16 to 87 years. Persons with severe head injuries were not included in the group. The study showed that the injuries accompanied with mild electroencephalographic changes disappeared within a few minutes in the vast majority of cases. Patients who had a history of amnesia following cerebral trauma but were clear mentally at the time the electroencephalogram was taken showed a slight increase in the percentage of abnormal records, as compared with the controls. Abnormality in the tracings was the rule in cases in which impairment of consciousness was present at the time the record was taken. Electroencephalographic records taken within thirty minutes after the injury showed a greater percentage of abnormality than those taken after more than thirty minutes.

JAHR, Omaha.

THE BRUNS SYNDROME. B. J. ALPERS and H. E. YASKIN, J. Nerv. & Ment. Dis. **100**:115 (Aug.) 1944.

The syndrome described by Bruns in 1902 consists of periodic attacks of violent headache, vomiting and vertigo, visual disturbances on change of posture of the head and freedom from symptoms between attacks. To these symptoms the present authors add a third feature, a constant anterior flexion of the head, usually in the midline but at times with a lateral flexion and rotation. The syndrome indicates in the vast majority of cases an organic lesion in the fourth ventricle or the adjacent structures. It is also found with tumors in the midline and in the cerebellum, with tumors of the third ventricle and with lateral tumors. The symptoms are due to blockage of the ventricular system on changes of posture of the head and to obstruction of the flow of cerebrospinal fluid. From the authors' studies it is suggested that the disturbance in the vestibular mechanism of the brain stem may be responsible for the symptoms.

JAHR, Omaha.

FACIAL PARALYSIS—PROSOPOPLEGIA. HAROLD R. MERWARTH, New York State J. Med. **44**:1546 (July 14) 1944.

Merwarth reviews 500 cases of paralysis of the facial nerve that he has personally studied. Of 304 instances of Bell's palsy, 20 occurred in the first decade of life and 55 in the second decade. Exposure to cold was given as a cause in but 13 of the 304 instances. The facial nerve has a tendency toward spontaneous recovery, best noted in patients with a pure motor paralysis.

AIKMAN, Rochester, N. Y.

ELECTROENCEPHALOGRAPHY IN CHILDREN. M. G. PETERMAN, Wisconsin M. J. **43**:708 (July) 1944.

The electroencephalogram has become indispensable in any complete neurologic examination and has modified the entire concept of convulsive seizures. Cerebral dysrhythmia can be demonstrated in 95 per cent of epileptic patients and has been found in 52 per cent of their immediate relatives. This confirms the contention that "idiopathic epilepsy is an inherited and transmitted

cerebral defect." Typical records of the various types of seizure, grand mal, petit mal and psychomotor, are well established. Illustrations are given. The Rosett, or deep breathing, test will often precipitate an attack and is usually used in making a tracing. Electroencephalography can be used to follow the patient's progress in the treatment of epilepsy. It may aid in establishing the diagnosis for children with rare or unusual seizures mistaken for nightmares or "fainting spells." The electroencephalogram may also aid in the localization of brain tumors.

BAIRD, Wauwatosa, Wis.

RECENT ADVANCES IN THE TREATMENT OF MENINGITIS. VICTOR CORDES, Wisconsin M. J. **43**:795 (Aug.) 1944.

(In fairness to the author, it should be stated that this article was prepared in September 1942.)

Administration of serum in treatment of meningitis is now usually confined to the intravenous route, with the intrathecal route used only if the former method seems unsuccessful after forty-eight hours. Adequacy of serum therapy for meningococcic, pneumococcic and Hemophilus influenzae type B meningitis may be measured by testing the patient's blood for its ability to produce capsular swelling of the invading organism. Adequate levels of sulfapyridine, sulfathiazole or sulfadiazine may be obtained by the intravenous use of the sodium salts of the drugs. Chemotherapy plus serum therapy gives better results for pneumococcic meningitis in the younger age group and has made a tremendous change in the death rate from influenzal meningitis in patients over 7 months of age. Quick and heroic treatment of meningitis is essential.

BAIRD, Wauwatosa, Wis.

INFLUENZAL MENINGITIS. A. NASSAU, Arch. argent. de pediat. **22**:20-32 (July) 1944.

The incidence of influenzal meningitis has been increasing during recent years.

Clinical varieties of this entity are described. As to its etiologic factors, the author feels that association of the influenza bacillus with some form of influenza virus may play an important role.

A historical survey of different treatments employed is given, the prognosis having been improved with the advent of therapy with the sulfonamide compounds.

Alexander's serum is mentioned, but no clinical experience is reported, since that serum is not available in Germany. (This article was written in Germany and translated into Spanish.)

CASSORLA, Chicago.

PSEUDOCEREBRAL TUMOR IN A CHILD. F. DE FILIPPI, Arch. argent. de pediat. **22**:44 (July) 1944.

The case of a 7 year old boy presenting signs and symptoms consistent with cerebral tumor is reported. The author feels, after an exhaustive consideration of the differential diagnosis, that this case is similar to others in which the diagnosis of "epidemic papilledema" has been made by Dr. Carrillo, of Buenos Aires.

This condition is characterized by its occurrence during the summer months and by vomiting, fever, headache and papilledema. Its prognosis is good, for all the patients treated recovered. Dr. Carrillo believes that there might exist some relationship between the causative agent of this "localized encephalitis" and poliomyelitic virus.

CASSORLA, Chicago.

Psychology and Psychiatry

THE PSYCHIATRIST LOOKS AT THE CHILD PSYCHIATRIST. KARL M. BOWMAN, Am. J. Psychiat. 23 (July) 1944.

This paper should be read in the original.

JAHR, Omaha

ELECTROENCEPHALOGRAPHY IN BEHAVIOR PROBLEM CHILDREN. MAX DEUTCHER, Am. J. Psychiat. 51 (July) 1944.

The electroencephalographic records of the 20 behaved boys in a junior high school class were compared with the tracings of the 20 most troublesome in the same class. The age range of the two groups was the same, 13 to 16½ years. There were 12 normal tracings in the first group, and 11 in the second group. The individual intelligence level of the showed no influence on the tracings. Generally, results are described as confusing. In the author's opinion, the most that can be said at present is dysrhythmia may be regarded as a probable additional unfavorable factor among many other factors that adversely influence behavior.

JAHR, Omaha

HEREDITY IN THE FUNCTIONAL PSYCHOSES. R. ROSENBURG, Am. J. Psychiat. **101**:157 (Sept.)

Four methods have been used in the study of heredity: (1) that of Galton, the family history method; (2) of Mendel, the experimental method; (3) a combination of (1) and (2), and (4) the identical twin method.

While the author believes that all four methods are open to wide criticism, since conclusions are based on fallacious reasoning, he accepts the identical twin method as the most reliable of the group at the present time for making deductions regarding the heredity of functional psychoses. From his own studies and from careful evaluation of reliable papers in the literature the author concludes that heredity plays no part in psychoses. In fact, he believes that the poor therapeutic results for the functional psychoses seem to be due to neglect of the environmental schools of psychiatry.

JAHR, Omaha

CONSIDERATIONS OF THE RELATIONSHIP OF PRIMARY AND SECONDARY MENTAL DEFICIENCIES, CONVULSIVE DISORDERS, AVITAMINOSIS AND ALTERATION OF THE NEURONEURAL POTENTIAL. GEORGE COOK, Am. J. Psychiat. **101**:166 (Sept.) 1944.

The author divides mental deficiencies into three groups: (*a*) primary, due to inherent germinal defect which precludes cerebral development; (*b*) secondary due to a defect in the germ plasm with a predisposition to cerebral degeneration, and (*c*) those based on various etiologic factors other than (*a*) and (*b*) (trauma, infection, toxemias, nutritional deficiencies and others).

Studies of the effects of the different agents on mental deficiency and on convulsive disorders are reviewed. In the author's opinion, the prominence of certain causes of epilepsy seems to vary with the ideologic approach of the examining physician. The findings at autopsy tend to minimize the so-called idiopathic epilepsy and to emphasize the importance of incomplete or defective cerebral development.

Every person has a tendency to convulsions. Normally there is a high threshold at which usual minor stimuli do not disturb the neuronic force; therefore there is no convulsion. The neuronic pot

y be seen in terms of a normal electroencephalo-aphic rhythm. The person with a low neuronic eshold under certain stimuli has a tendency to un-trolled release of force, which is expressed in a zure. Such persons show an abnormal electro-ephalographic rhythm superimposed on a normal thm.

JAHR, Omaha.

Diseases of the Ductless Glands; Endocrinology

E ENDOCRINE FACTOR IN HOMOSEXUALITY: REPORT OF TREATMENT OF 4 CASES WITH ANDROGEN HORMONE. LOUIS A. LURIE, Am. J. M. Sc. **208**:176 (Aug.) 1944.

The author describes and discusses 4 cases of homo-uality in males and stresses the need of the somato-chic approach to an understanding of them.

The division of homosexuality into innate and acquired suggested. The importance of the endocrine factor the former is discussed, and the beneficial results of tment with testosterone propionate in 4 such cases reported.

HENSKE, Omaha.

Diseases of the Muscles, Bones, Joints and Lymph Glands

E HEART IN RHEUMATOID ARTHRITIS. DENNISON YOUNG and JOHN B. SCHWEDEL, Am. Heart J. **28**:1 (July) 1944.

The authors studied at autopsy 38 cases of rheumatoid ritis. Cardiac lesions were found in 33, and in 25 hese the process was regarded as rheumatic in origin.

The authors conclude that the high incidence of rheu-ic heart disease in rheumatoid arthritis suggests possibility that the two conditions may be manifes-ns of a single disease process.

GIBSON, Chicago.

NORMALITY OF FIRST AND SECOND RIBS FORMING AN INFRACLAVICULAR TUMOUR. A. P. GUTTMAN, Canad. M. A. J. **51**:53 (July) 1944.

n infraclavicular tumor in a 9 year old girl is orted on. The mass was not adherent to the clavicle was painless. It extended from the side of the num, tapering up toward the inferior surface of the icle. Roentgenologic examination showed a synos-s of the first and second ribs on the left side.

MOORE, Omaha.

L'S DISEASE IN A FIVE YEAR OLD BOY. J. C. BERTRAND, J. R. DIAZ NIELSON and R. A. LARROGUE, Arch. argent. de pediat. **22**:241 (Sept.) 1944.

ainful and swollen joints appeared in a 2 year old and three similar bouts occurred before the child hospitalized in January 1944, when he was 5 years

hysical manifestations were those considered typical Still's disease. The spleen was not palpable. The nt was treated with salicylates, vitamins and other icines, to no avail. He was subsequently discharged is family's request.

he most important signs and the etiology of this cal entity are commented on. Some considerations regard to treatment are given.

CASSORLA, Chicago.

Skin Diseases; Allergy

IMMUNOLOGIC STUDIES OF POLLINOSIS: VII. SHORTENING THE TREATMENT OF HAY FEVER. MARY HEWITT LOVELESS, J. Allergy **15**:311 (Sept.) 1944.

This is a long article reporting the work that was done on 26 patients with hay fever to show the value of booster courses in treatment. The author states definitely that the work is still in the experimental stage and is not ready for general application. She reports excellent results with 24 of the 26 patients, who lived in the New York area. The booster course was given to persons who had had treatment in the previous year; it consisted of 10,000 units given in seven graduated doses. In most instances the degree of sensitivity was assayed by tests done on the serum, the skin or the eye.

The author feels that the conjunctival test is the most accurate.

HOYER, Cincinnati.

STUDIES ON THE BLOCKING ANTIBODY IN SERUM OF RAGWEED-TREATED PATIENTS. H. HAROLD GELFAND and D. EDWARD FRANK, J. Allergy **15**:332 (Sept.) 1944.

The blocking antibody response was studied in 34 patients with ragweed pollinosis who were treated with ragweed antigen.

A blocking antibody is produced in ragweed-sensitive patients by injection of ragweed antigen. High doses of antigen did not produce a high titer in 53 per cent of the patients. In 50 per cent of the patients treated in previous years high titers developed.

"Clinical results apparently do not depend upon high blocking antibody titers. The percentages of good results was identical in the patients who had low titers and in those who had high titers."

HOYER, Cincinnati.

ON THE ALLERGEN IN HUMAN DANDER. FRANK A. SIMON, J. Allergy **15**:338 (Sept.) 1944.

The author feels that allergy to human dander is an established fact. This allergy is often associated with atopic dermatitis. It may be of etiologic significance in some cases; in others its effects are limited to concomitant subclinical sensitivity. The human dander allergen is present in scales of seborrheic dermatitis.

HOYER, Cincinnati.

HEREDITARY HEMORRHAGIC TELANGIECTASIA: REPORT OF A CASE WITH REVIEW OF THE LITERATURE. JAMES J. BARROCK, Wisconsin M. J. **43**:805 (Aug.) 1944.

"Hereditary hemorrhagic telangiectasia is a congenital hereditary familial disease, characterized by repeated large and small hemorrhages from superficial angiomata and telangiectases. These are present on the mucous membranes of the nose, lips, tongue, gingiva, palate, larynx and less often on the conjunctiva . . . skin of the face, ears, trunk, back, arms, hands . . ." Hemorrhages have been reported from the bowel, the lungs and the kidneys and in the central nervous system. Both sexes may have and may transmit the disease. "This entity has often been overlooked or has been mistaken and called hemophilia or hemorrhagic purpura."

The syndrome was first described by Babington in 1865. Numerous names have been applied to it. A review of the literature is given in detail.

The prognosis is fairly good. The telangiectases usually develop during or after adolescence. About

4 per cent of the affected patients die from bleeding and the resulting anemia. BAIRD, Wauwatosa, Wis.

CONTROL OF SCABIES BY USE OF SOAP IMPREGNATED WITH "TETRA-ETHYLTHIURAM MONOSULPHIDE" ("TETMOSOL"). R. M. GORDON, T. H. DAVEY, K. UNSWORTH, F. F. HELLIER, S. C. PARRY and J. R. B. ALEXANDER, Brit. M. J. **1**:803 (June 17) 1944.

The Imperial Chemical Industries, Ltd., were able to combine tetraethylthiuram monosulfide with soap and found that it remained chemically unaltered for over a year. The sarcopticidal activity of this compound is widely known. Six patients with scabies received five to six baths with 20 per cent tetmosol soap on three successive days. All were cured. A group of 110 men received three baths with 20 per cent tetmosol soap over a period of a week. All of these patients remained under observation for at least six weeks; 80 per cent were found to be cured, and 20 per cent had a relapse. While this rate of cure is not so great as that with other well established agents for the treatment of scabies, it is felt that the general use of this soap would be helpful in communities afflicted with scabies which are disrupted by the war confusion, and it is suggested that washing with tetmosol soap would be of value in keeping down the instance of scabies. Such general use, however, will be possible only if it is found that a high incidence of dermatitis does not follow the prolonged use of this soap. BIRDSONG, University, Va.

IMPETIGO CONTAGIOSA TREATED WITH MICROCRYSTALLINE SULPHATHIAZOLE. JOSEPH W. BIGGER and GEOFFREY A. HODGSON, Lancet **2**:78 (July 15) 1944.

Of 50 patients with impetigo contagiosa who were treated with microcrystalline sulfathiazole 48 were cured in an average of five and three-tenths days. Oozing usually ceased within one or two days, and the epithelium rapidly regenerated. The cure was sometimes delayed by the appearance of fresh lesions. The time required for the cure of the disease was shorter than with any treatment previously used. In only 1 patient treated with microcrystalline sulfathiazole did sensitivity develop. LANGMANN, New York.

THE AMERICAN APPROACH TO ALLERGY IN CHILDHOOD. HENRY N. PRATT, Proc. Roy. Soc. Med. **37**:309 (May) 1944.

Allergy, a term meaning specifically "altered reactivity," refers to a broad field of immunology, including not only the atopical diseases but drug idiosyncrasy, serum disease, tuberculous allergy and a host of other conditioned reactions. In the group of atopical diseases fall asthma, hay fever, eczema, urticaria and some gastrointestinal diseases manifested in childhood. All are characterized by familial disposition, multiplicity of manifestations, eosinophilia, the immediate wheal and flare type of cutaneous response, presence of reagins in the serum and flaring up of the pathologic process by contact with specific excitants, usually proteins. The author then mentions the many types of therapy which have been recommended for these diseases, especially asthma. Immunologic discoveries by Blackley, Noon, Harley and Cooke, when carried to their logical conclusions, led to a more specific approach to the atopical diseases, and this method of attack resulted in the most satisfactory therapeutic results. The management of large pediatric allergy clinics in America is described. The fundamental factor which makes one person respond violently to a substance which is innocuous most people is not known. A long chain of circumstances result in the allergic explosion.

In conclusion, the author states the belief that immunologic approach is not the ultimate solution the problem of atopical diseases. He believes the rational approach to be through the autonomic nervous system, with especial reference to the parasympathetic nerve endings, the secretion of acetylcholine and physiology of histamine. The latter substance activ the fundamental physiologic response of increased capillary permeability, smooth muscle spasm and eosinophil infiltration, responses which are fundamental in allergic reaction. WILLIAMSON, New Orlean

Surgery and Orthopedics

FAULTY POSTURE IN CHILDREN. DAVID ANSP Wisconsin M. J. **43**:703 (July) 1944.

Physicians have only recently begun to realize faulty posture, with the associated changes in the tomic relationships of skeletal elements and viscera, be important in producing some of the chronic dise Faulty posture is common in children. The caus factors are rarely congenital. Fatigue is the most mon predisposing factor, with illness, improper clot and improper furniture also important.

Preventive treatment aims to eliminate the caus factors. Active treatment with postural training be done best in a posture class. Diagnosis of poor ture must be made by more careful routine check-

BAIRD, Wauwatosa, W

Teeth and Dentistry

THE DENTAL NEEDS OF MASSACHUSETTS CHIL OF TODAY. PAUL E. BOYLE, WARREN R. SIS BASIL G. BIDDY and RUTH L. WHITE, New Eng J. Med. **230**:9 (Jan. 6) 1944.

The deplorable condition of the teeth of the y men of this country has been made prominent by fact that dental defects have been the greatest s cause for rejection by the armed services. Massa setts, in common with other New England states, in this particular a record far worse than that of o sections of the country. Independent examination school children 10 to 12 years of age in Massachu and in Maryland showed approximately twice as g an incidence of dental caries in the Massachusetts dren.

There is no doubt that loss of teeth can be preve by adequate dentistry. Even in peacetime it is estim that approximately 70 per cent of the population re no dental care other than treatment for the relie pain.

What about the prevention of dental caries? prevalence of tooth decay in spite of the expenditu large sums on toothbrushes and dentifrices indi that such measures are not effective. Conside evidence is available that sugars and starches pro the initiation and progress of tooth decay. It is established that such a simple procedure as finishi meal with an orange or an apple rather than with or candy may be associated with relative freedom tooth decay. This effect seems attributable chief the local cleansing action of the fruit, as oppose the debris left on the teeth by the pastry, rather to the superior nutritional value of the fruit.

Many investigators have reported a correlation between nutritional improvement and reduction of dental caries in children. The treatment of dental disease is a province of the dentist, but its recognition is equally the responsibility of the physician.

GENGENBACH, Denver.

IMPROVED DENTITION OF 5-YEAR-OLD LONDON SCHOOL-CHILDREN: A COMPARISON BETWEEN 1943 AND 1929. MAY MELLANBY and HELEN COUMOULOS, Brit. M. J. **1**:837 (June 24) 1944.

The authors report the results of two large scale dental surveys of 5 year old children in the same or comparable schools of the London County Council in 1943 and 1929.

During the intervening period great improvement has taken place both in the structure of the deciduous teeth and in their resistance to decay. 1. Nineteen per cent of the children had teeth of perfect, or nearly perfect, structure in 1943, as compared with 8 per cent in 1929, and only 33 per cent had very defectively formed teeth, i.e. teeth with much M-hypoplasia (imperfections of enamel structure), as compared with 58 per cent in 1929. In 1943, 22 per cent of the children, according to the standards used, were "caries free," as compared with but 5 per cent in 1929.

That there is still great room for improvement in dental condition is demonstrated by the fact that even at the present time between 56 and 95 per cent of children in individual schools visited in the two surveys had dental decay in at least some of their teeth.

It is thought that the observed improvement in the dental condition of this age group may be largely due to the changes in feeding habits which have been developing in recent years—in particular to the introduction in 1934 of the cheap milk scheme of the Milk Marketing Board and, later, to the wartime food policy, which included (*a*) increased allowances of milk, together with cod liver oil and fruit juices, to pregnant and nursing women, to infants and to young children; (*b*) the addition of vitamins A and D to oleomargarine, and (*c*) the addition of calcium carbonate to bread. These are dietetic changes which investigations on animals and children carried out by one of the authors before 1917 have established as essential for the improved dental condition of the general child population.

BIRDSONG, University, Va.

Miscellaneous

"DRUG FEVER" ACCOMPANYING SECOND COURSES OF SULFATHIAZOLE, SULFADIAZINE AND SULFAPYRIDINE. HARRY F. DOWLING and MARK H. LEPPER, Am. J. M. Sc. **207**:349 (March) 1944.

Of 144 patients who received a second course of sulfathiazole, sulfadiazine or sulfapyridine after various intervals since the first course of therapy with the same sulfonamide compound, 16 (11.1 per cent) had "drug fever." Eleven of these patients had concomitant dermatitis, which in 2 was associated with conjunctivitis. Of 169 patients who received a second course of sulfathiazole, sulfadiazine or sulfapyridine after a first course with another sulfonamide compound, 6 (3.6 per cent) had "drug fever." Of 737 patients who were observed during a single course of therapy with sulfathiazole, sulfadiazine or sulfapyridine, 37 (5 per cent) showed febrile reactions.

Febrile reactions were more frequent after a second course of sulfathiazole, as well as during a single course of sulfathiazole, than they were with sulfadiazine or sulfapyridine.

Three to six courses of the same sulfonamide compound were given to 12 patients, in none of whom febrile reactions developed.

It is concluded that when a second course of a sulfonamide compound must be given a patient, regardless of the interval following the first course, another sulfonamide drug should be given.

HENSKE, Omaha.

THE TOXICITY OF SULFAMERAZINE AND SULFAMETHAZINE. L. H. SCHMIDT, HETTIE B. HUGHES, ELIZABETH A. BADGER and IDA G. SCHMIDT, J. Pharmacol. & Exper. Therap. **81**:17 (May) 1944.

After an extensive study on laboratory animals, the authors conclude that as regards acute and chronic toxicity there is little to choose between these two drugs and sulfadiazine. In acid urine, sulfamethazine seems almost nontoxic to the kidneys, and sulfadiazine appears to be more toxic than sulfamerazine, the toxicity seemingly being inversely related to the solubility, for when "solubility differences are eliminated by alkalization of the urine, sulfadiazine has almost as low renal toxicity as sulfamethazine."

PILCHER, Cleveland.

THE CHEMOTHERAPEUTIC ACTIVITIES OF SULFAMERAZINE AND SULFAMETHAZINE. L. H. SCHMIDT, CLARA L. SESLER and HETTIE B. HUGHES, J. Pharmacol. & Exper. Therap. **81**:43 (May) 1944.

"The comparative activities of sulfamerazine, sulfamethazine, and sulfadiazine against experimental infections with pneumococci, β hemolytic streptococci, Friedländer's bacilli, staphylococci and dysentery bacilli have been determined. The results have shown that sulfamerazine and sulfamethazine are slightly superior to sulfadiazine in the treatment of pneumococcal septicemia in mice and meningitis in rats. Sulfadiazine was as effective as or slightly more effective than the other drugs against infections with β hemolytic streptococci and Friedländer's bacilli and was distinctly superior against infections with staphylococci and dysentery bacilli. The bearing of these observations on the clinical use of the three drugs has been discussed."

AUTHORS' SUMMARY.

CLINICAL STUDIES OF SULFAMETHAZINE. WALSH MCDERMOTT, D. ROURKE GILLIGAN, CHARLES WHEELER and NORMAN PLUMMER, New York State J. Med. **44**:394 (Feb. 15) 1944.

Sulfamethazine was given to 34 patients with various infections. A large percentage of these patients showed very high acetylation of the drug. Sulfamethazine is less satisfactory and reliable than is sulfadiazine.

AIKMAN, Rochester, N. Y.

MENDOZA QUADRUPLETS: FIRST REPORT. AGUSTIN ZUBILLAGA and L. ZAPATA GONZALEZ, Arch. venezol. puericult. y pediat. **4**:641 (April-June) 1942.

This is the story of the Mendoza quadruplets, born in the Andes mountains of Venezuela in 1942.

Their weights were 1,980, 1,305, 1,375 and 1,235 Gm. respectively. The story of their care and transportation to the hospital is intensely interesting. Appropriate charts of their mental and physical gains are given. All are living and well today.

SANFORD, Chicago.

Society Transactions

CHICAGO PEDIATRIC SOCIETY

MORLEY D. MCNEAL, *President, in the Chair*

Oct. 17, 1944

Efficacy of the Vollmer Patch Test: Report of 460 Cases, with Correlation of Clinical and Roentgenographic Findings in 115 Cases of Primary Tuberculosis. DR. ALFRED D. BIGGS and MISS IRENE STOLP.

There is no uniformity of opinion concerning the fundamental biologic responses set up in the human body when tubercle bacilli are introduced into it. There is abundant evidence that an allergic response is set up in the tissues of experimental animals by the introduction of tubercle bacilli. On the other hand, it is generally accepted that tubercle bacilli evoke some sort of immunologic reaction in the experimental animal and also in man. The physician must decide which is the dominant factor in the control and spread of tuberculosis.

One of the chemical constituents of the tubercle bacillus is an unstable water-soluble protein. Sensitivity to tuberculin is due solely to this tuberculoprotein. The intradermal P. P. D. (purified protein derivative) tests are made with this protein.

The P. P. D. tests were used as a standard in determining the efficacy of the Vollmer patch test. Four hundred and sixty children were given the two tests at the same time. One hundred reacted positively to both tests. Three hundred and forty-five reacted negatively to both tests. The results of the two tests disagreed for 15 children, or 3 per cent of the entire series. The Vollmer patch test is less sensitive than the P. P. D. test.

There were, therefore, 115 children who reacted positively to at least one of the tests. These 115 children were studied as follows: Each was routinely brought back to the clinic every third or every sixth month. At each visit the child was weighed and measured, his temperature was taken and a physical examination, including a study of the chest, was made. Serial roentgenograms were made, usually once a year. Blood counts were recorded for each child. More than half the group have been under observation for five years and many for ten years or longer.

The following observations were made: These children did not have prolonged fever. Repeated examinations of their chests showed nothing abnormal. The children grew and gained weight normally. The average red blood cell count was 4,100,000 per cubic millimeter; the average white cell count, 7,500 per cubic millimeter, and the average hemoglobin concentration, 13.2 Gm. per hundred cubic centimeters of blood. The pulmonary lesions in many instances were followed by means of serial roentgenograms from the stage of a diffuse peripheral lesion to that of calcification of the hilar glands; at the time of writing 75 per cent of the children have already shown calcification.

A careful history revealed known tuberculous contact for only 38 per cent of the positive reactors. The incidence of primary tuberculosis was only 12 per cent higher in the Negro and Mexican group than in group of white children.

The results of the Vollmer patch test and those the P. P. D. test agreed in 97 per cent of the ent series, the former test being a little less sensiti Primary tuberculosis of the lungs is a subclinical dise It can be detected only by a tuberculin test. Its cou can be best followed by means of serial roentgenogra

These groups are to be enlarged and followed throu adolescence and beyond. If allergy is the domin factor, the morbidity and the mortality rate will higher among the positive reactors than among negative reactors. If immunity is the dominant fact the morbidity and the mortality rate will be lo among the positive reactors.

DISCUSSION

DR. EDWARD L. JENKINSON: I have enjoyed Biggs's paper. I have had an opportunity over a num of years to know what painstaking work he has b doing at the hospital and have had a little to do w the roentgenologic aspects of some of the examinatio I shall not attempt to discuss the relative merits allergy and immunity, or resistance; you all know t question is controversial. There are two schools: T Walgren school believes in immunity, and Stuart Meyer are not impressed with its value.

I should like to say a word about roentgenograp surveys of the chest of children and of adults. I th surveys are important and fact finding. I do not beli one roentgenogram, one survey, is sufficient. A negat roentgenogram gives a false feeling of security, and is known that during the period of incubation a negat film may be obtained while later films will be positi If one keeps this fact in mind, the value of serial fi becomes apparent. It is much easier to make a sur for an adult than for a child, and it is easier to say w some degree of accuracy that tuberculosis is or is present in an adult. I believe that if adults were stud by means of serial films from time to time tuberculo would eventually be stamped out; if it is controlled the adult, it will be eradicated eventually in the ch In most hospitals it is demanded that every patient h an examination of the blood and urine; this is a s forward. I believe, however, that it is just as import that every patient have a roentgenogram of the ch It is important to the patient to know whether he casts in the urine or whether he has anemia; but fro public health standpoint it is more important to kn whether there is tuberculosis in the lung, for this i communicable disease. I think all hospitals will even ally demand roentgenograms of the chest. I beli they should be made so low in cost that the physic cannot afford not to have them made, as a protect measure.

Because tuberculosis passes through an incubat period, probably three to eight weeks must elapse bef any pathologic changes are revealed in a roentgenogr Roentgenographic examination of the chest is imp tant from the standpoint not only of tuberculosis of other lesions. I do not mean that the roentgenogr shows signs which are pathognomonic of tuberculos it does not. I mean that there must be teamwo

ions in the chest of the child are difficult to deter-
e, with one exception—the miliary type—and even
may be confused with carcinoma metastatic from
thyroid.

n this work of Dr. Biggs's, nothing has been known
ut the patients. The roentgenologist can tell only
t he sees; it is for Dr. Biggs to work out the rest
the picture. One cannot expect too much of the
ntgenogram or of the roentgenologist. Most of the
ons in a child are not necessarily parenchymal.
st are in the hilus, probably because drainage is
fly to the hilus.

is believed that calcification follows caseation. How
does it take for this process to show in the roent-
ogram? Most physicians believe that it occurs earlier
two to four years in children than in adults. I
ve it is occasionally observed after six months.
at does it mean? So far as is known, it means
erculosis. Is the calcification on the roentgenogram
iterion as to whether the lesion is healed? I think
depends on how small and how hard the area is.
exposure of the film and the angle at which it was
n are also important. If one sees a lesion less
1 cm. in diameter, homogeneous and hard, that
n is healed. I believe there must be teamwork with
ical medicine. Roentgenograms are difficult to
rpret, even for persons who study them every day.

DR. ALFRED D. BIGGS: I appreciate this discussion.
e Copenhagen patch consists of old tuberculin placed
a piece of adhesive tape without absorbable material.
e Vollmer patch is a piece of material soaked in old
erculin and placed on adhesive tape. From the
dpoint of the child and the mother, a test with this
e of patch is preferable to the Mantoux test; that is
oint to be considered. The adhesive tape is removed
days after the patch is put on, and the results of
test are not read until two days later; the reaction
n the adhesive tape is presumed to be taken care of
this way.

We did not routinely investigate the family situation.
st of the histories of contacts involved members of
family. If a child has a positive reaction to a test,
the members of the family should be examined, but
was not done routinely, and I do not have any
ures on it.

Something should be said about the percentage of
ctors in the population at large. In our dispensary
ulation the number of reactors is less than 25 per
t. The reasons have already been stated. Many
veys have been made in different parts of the United
tes, for the most part using large groups of school
ldren. Most of these surveys were not checked with
ntgenograms, but the figures in general varied from
to 25 per cent. These studies involved young people
school age. It was formerly taught in medical
ools that 95 per cent of adults have had primary
erculosis, but this condition does not obtain now,
sumably because tuberculosis is better controlled,
ecially the bovine type. At the Municipal Tuber-
osis Sanitarium there are statistics for children of
Chicago area by ages from 5 or 6 years to 21 years.
this whole group the percentage is about 20 per
t, or a little higher. It is a misconception that
st persons have a positive reaction to the tuberculin
t. Possibly that is true of the older generation, but
s certainly not true of the younger generation.

have not kept statistics on office practice. If a
ld comes in for whom I think examinations of the
od and urine should be made, I also do a patch test.
casionally the reaction is positive, and the mother
becomes worried. I tell her that I think the child's condition is a little worse because he reacts positively to tuberculin but that many physicians hold a different opinion. I emphasize the point that the child should have a roentgenogram every year, so that if he becomes reinfected with tuberculosis the disease can be detected early. If the test has any value, it is to weed out the children who should be followed through adolescence and early adult life with roentgenographic examinations.

Nutrition in Puerto Rico. DR. LYDIA J. ROBERTS.

The nutrition problem in Puerto Rico is serious: It is estimated that 75 per cent of the population is living below even minimum standards of adequacy. The density of the population is more than 544 per square mile (210 per square kilometer), the laboring class forming the great majority of the population; the standard of living is extremely low. Employment is seasonal, and wages are uncertain. There have been no war industries to take up the slack in labor, and cutting down of shipments of sugar cane and other crops has reduced employment. At the time of writing 40 per cent of the population is certified by the Food Distribution Administration for free food.

The low income groups have never had enough food, especially food of the kind that supplies proteins of high quality and the minerals and vitamins needed for adequate nutrition. Their diet is high in starchy vegetables and cereals, especially rice. Among all the economic groups there is deep-seated dependence on a traditional group of basic foods—rice, beans and codfish, with starchy vegetables and lard. The present survey indicates that the chief deficiencies are in proteins of good quality, calcium, riboflavin and vitamin A.

Even to the casual observer the children appear generally under par and of small size; they look several years younger than their actual age. Surprisingly, deficiency diseases are not so common as might be expected. Pellagra in fully developed form is relatively rare, although earlier signs, such as glossitis and beginning cutaneous changes, are common. Many persons appear to be in the danger zone with respect to the amount of vitamin C ingested. Anemia is extremely prevalent, a situation possibly due in large measure to hookworm. Sprue is one of the most common diseases. The early signs of vitamin A deficiency, such as follicular conjunctivitis, night blindness and Bitot's spots, are common. That frankly deficiency diseases are not more common is probably explained by the fact that the diet is deficient in everything; as a result, the people do not have any one deficiency but simply do not grow to full size or vigor. The fact that beriberi is uncommon is explained by the widespread use of beans when they are obtainable and of oranges and other fruits, which are eaten freely when in season.

One interesting observation is that the teeth seem surprisingly good in view of the generally poor diet; another, that the poorest rural children tend to have better teeth than urban children. Studies on this situation might throw light on the causes of dental caries.

The entire problem of nutrition is primarily an economic one, and as an emergency measure in the present situation relief feeding is necessary. Some improvement is hoped for through increased production of food at home and through education in better use of present resources. In the meantime, lunches are furnished at school, and milk feeding stations are functioning for children under school age.

Puerto Rico has always imported a large proportion of its food. When the submarine menace was at its height in the South Atlantic and the Caribbean Sea, rice and other staples were not available for several months, and it was realized that food must be produced at home. Pressure has been exerted on growers of sugar cane to produce other food crops, in order that they may be eligible to receive benefits from the Agricultural Adjustment Association. The production of foods on the smaller farms is not easy. It has been believed that the wise procedure is to plant high yield cash crops, like sugar cane and tobacco, and to import foods which can be shipped in for less than it costs to raise them. Also, laborers on the plantations in the past had as a rule no space to plant crops or to raise chickens. There is little knowledge on the part of many rural people of how to produce food crops or how to raise animals. In spite of these handicaps, the program is making good headway. Families are encouraged to raise rice, which when hulled and not polished retains its full content of thiamine, iron and other vitamins and minerals. Loans are being granted for the breeding of rabbits, goats and cows. The raising of pigs, chickens and other farm animals is also being stressed. These animals are already making a significant contribution to the protein supply of many families. Efforts are being made to develop the fishing industry, which, because good fish beds are not readily accessible, has not been product

The entire program is, of course, largely educatio and courses in health education and nutrition are be given in the schools. The purpose of the nutrit workshop has been to bring together persons from the agencies on the island who are in a position help improve existing conditions. The island was divi into districts, in each of which conferences were h To these conferences were invited teachers, extens workers, members of the clergy and all the other lead in the locality, so that a program of action might transmitted to each community. It is believed that people are now more fully aware of the problems that everything possible will be done to solve them

DISCUSSION

DR. JESSE R. GERSTLEY: It is a remarkable fact t the natives prefer the white to the yellow vegetab when they have access to both. Of course, there is the United States the analogy of the preference white bread over the whole wheat variety. But amo the natives social aspiration cannot exert much influe in selection of diet. There must still be some factor the vitamin problem that has not been explained, it would be interesting to know what it is.

Book Reviews

Physical Growth from Birth to Two Years: I. Stature. By Howard V. Meredith, Ph.D. Price, $1.50. Pp. 255, with 23 tables. Iowa City: University of Iowa Press, 1945.

"Physical Growth from Birth to Two Years," by Howard V. Meredith, Ph.D., is a 253 page monography from the University of Iowa Studies in Child Welfare. The first half of the volume presents a scholarly analysis of data relevant to eleven specific problems of stature. The second half contains an annotated bibliography on infant stature, covering all the studies published in North America from 1850 to 1942. The appendix contains twenty-three tables displaying central tendency and variability values for stature at nine infancy ages.

In this book Dr. Meredith has compared all the available data from the many investigations and presented a critical appraisal of the information so obtained converted to a common scale of reference. In so doing, he has rendered a real service to pediatricians, child welfare workers and others, who would find it difficult

Central Tendency and Variability Values (cm.) for Average Stature

Age, Mo.	Number of Averages	Median Value	Percentiles 25th	Percentiles 75th	Range of Averages
		Both Sexes			
Birth	31	50.2	49.7	50.5	48.4-53.9
3	41	60.0	59.4	60.7	55.2-62.3
6	50	66.4	64.9	66.8	59.8-68.0
9	40	70.9	66.9	71.5	65.1-73.5
12	51	74.6	73.1	75.5	68.5-78.3
18	38	79.4	77.5	81.3	72.4-82.9
24	42	85.3	83.5	87.4	79.9-88.5

with to encompass the research and to interpret the results.

The influence on stature of secular change, sex, socioeconomic and race differences and the effects of illness and dietary treatments are all carefully analyzed and presented to show the degree of association between stature in infancy and the above variables.

Dr. Meredith has brought together in conveniently usable form the mass of data dealing with stature in infancy. By means of his orderly arrangement and appraisement of the materials amassed, he has a quantitative foundation able to support precise statements of fact. Some of his statements are quoted in the following summary of average stature from birth to 2 years.

Findings which accrue are:

1. Central tendency values of 50.2 cm. at birth, 60.0 cm. at three months, 66.4 cm. at six months, 74.6 cm. at one year, and 85.3 cm. at two years.

2. Increases in central tendency of 24.4 cm. between birth and one year, 10.7 cm. between one and two years, and 35.1 cm. (practically 70 per cent) between birth and two years.

3. Differences between the limits within which the central one-half of the averages lie of 0.8 cm. at birth, 1.3 cm. at three months, 1.9 cm. at six months, 2.4 cm. at one year, and 3.9 cm. at two years.

4. Differences between the minimum and maximum averages reported of 5.5 cm. at birth, 7.1 cm. at three months, 8.2 cm. at six months, 9.8 cm. at one year, and 8.6 cm. at two years.

5. Overlapping of the distributions for every adjacent age from three months to two years. The highest three averages at age eighteen months exceed 15 per cent of the averages for two years, and the lowest three averages at eighteen months are exceeded by over 35 per cent of the averages for one year.

SECULAR DIFFERENCES

On the whole, the direction of the secular trend for stature in infancy has been upward. It is well established that the typical North American, White infant was shorter in the decade 1880-90 than in the decade 1930-40. With regard to amount of increase, this has been less for neonates than for older infants. At birth the typical infant of 1880-90 was apparently about 0.5 cm. (one-fifth of an inch) shorter than the infant of 1930-40. At ages one to two years, it appears a sound generalization that the typical infant was no less than 1.5 cm. taller in 1940 than in 1915, and no less than 2.5 cm. taller in 1915 than in 1880. It follows that the average two-year-old child may be taken as at least four centimeters (one and one-half inches) taller for 1940 than for 1880.

RACIAL DIFFERENCES

Dr. Meredith has compared the studies of white, negroid and mongoloid infants with infants of northwestern and southeastern European ancestry and indicated the extent to which differences in stature are genetically determined and the extent to which stature is modified through changes in environment.

White infants exceeded Negro infants in average stature by roughly half an inch. The one average reported on Mongoloid infants lies in an intermediate position.

After a liberal allowance has been made for sampling differences in the socio-economic variable, the infants of northwest European ancestry were no less than half an inch taller than infants of southeast European descent.

GEOGRAPHIC DIFFERENCES

The average stature of North American infants appears not to be different for otherwise comparable samples drawn in California, Iowa and New York. This generalization must be regarded as specific for these localities and for the types of samples drawn. As yet, studies are available for relatively few geographic regions and adequately comprehensive intercomparisons cannot be made.

There is fragmentary evidence suggesting that infants living in rural areas and in large cities tend to be slightly shorter than infants residing in towns of moderate size. This should not be interpreted as more than a research lead awaiting substantial investigation.

SOCIOECONOMIC DIFFERENCES

Socioeconomic status probably encompasses such variables as diet, housing conditions, health practices, and selective mating. These cannot be measured from study to study with a single standardized instrument.

However, the studies tend to show that infants of the professional classes gain in stature at a faster rate than infants of the unskilled groups.

Dr. Meredith's conclusion follows:

On the whole it would appear that for the age span from three months to two years the difference in average stature between infants representing the two relatively small terminal segments of the distribution for socio-economic status approximates two centimeters. That this statement should be interpreted as no more than a *tentative* epitome of the limited materials presented in the two preceding paragraphs will be given reenforcement in the next section. Manifestly, the studies on the lower classes are too few to support a reasonably dependable generalization on the constancy or variation of the difference from age to age.

STATURE OF SOCIO-ECONOMIC GROUPS IN RELATION TO SYSTEMATIC HEALTH GUIDANCE

. . . Having found, then, that one-year-old infants of the indigent and semiskilled groups are about two centimeters shorter in average stature than infants of the professional and managerial groups, the question presents itself: How much can this difference be reduced by attempting to equalize certain items (e. g., diet and health practices) while not subjecting other items (e. g., selective mating and housing) to experimental modification? Concretely, what is the magnitude of the difference in average stature between infants living in poverty-stricken areas whose parents receive regular guidance regarding their dietary and health care, and infants of the professional classes? The studies show:

1. The average stature for infants of the lower classes given 'improved care' over the first year of postnatal life is greater than that for those under non-improved care.

2. For infants given 'improved care' throughout the first postnatal year, average stature shows a gross tendency to be greater at the middle and upper socio-economic levels than at the indigent or near-indigent levels. . . .

DIFFERENCES WITH PARITY, AGE AND STATURE OF MOTHER

. . . In every instance the average stature of first-born infants is lower than that for infants of higher birth orders. On the whole, the magnitude of the difference may be taken as 0.6 cm. . . .

. . . It appears that there is no relationship between the stature of infants at birth and maternal age *per se* (i. e., when birth order is held constant neonatal stature varies independently of maternal age).

'A real and positive correlation between the length of infants and the stature of their mother' of an order approximating $r = .20$. It is suggestive that in every instance maternal stature is associated slightly more closely with the stature of female infants than that of male infants.

SEX DIFFERENCES

1. Male infants exceed female infants in average stature at all ages from birth to two years.

2. At birth, the magnitude of the difference between the male and female means is 0.8 cm., or practically one-third of an inch.

3. Over the age period from three months to two years, the trend of central tendency for females is lower than that for males by approximately 1.7 cm., or two-thirds of an inch.

RATE OF GROWTH

1. There is a continuous decline in the rate of stature growth from birth to two years of age. For example, increase in average stature is greater betwee birth and three months than between three and si months. With each successive quarter-year th amount of gain diminishes.

2. The decline in growth rate is rapid in early in fancy and becomes gradually slower with advancing age. This is illustrated in that average stature at si months is over 30 per cent greater than averag stature at birth, while average stature at one year i only about 12 per cent greater than at six months, an average stature at two years is less than 7 per cen greater than at eighteen months.

For every individual the rate of growth is markedl higher for the period from birth to six months tha for the period from six to twelve months, and mark edly higher for the entire first year than for th second year.

. . . There is the suggestion that infants tall a birth tend to grow in stature at a somewhat slowe rate during their first postnatal year than infants shor at birth. Further, there is the tentative indicatio that no significant relationship exists between statur at one year of age and rate of growth in statur during the second postnatal year.

RELATIONSHIPS BETWEEN STATURE AND DISEASE

1. Jeans and Stearns (1938) have presented dat on six infants indicating that respiratory infectio may be associated with temporary (two to six weeks slowing or cessation of growth in stature.

2. A temporary slowing or cessation of statur growth has been reported by Hamil, Reynolds, Pool and Macy (1938) for 18 of a group of 21 infan considered to show roentgenographic evidence of mil scurvy.

3. After studying 170 infants roentgenographicall diagnosed as having slight rickets, Eliot, Nelso Barnes, Browne and Jenss (1936) have taken th position that 'definite conclusions concerning the re lationship of growth in length to the incidence o rickets' must await additional investigation.

4. During varying periods of treatment, four infan with celiac disease (Haas, 1924; Stearns, Jean Catherwood and McKinley, 1941) have been shown t gain in stature at a faster rate than clinically norma infants.

The more extensive findings for absolute statur may be brought together in a tabulation comparin the stature of infants having various diseases wit the stature of nonpathologic infants.

STATURE IN RELATION TO DIET

1. Infants fed pasteurized or evaporated cow's mil beginning at ages under one month are no short in average stature at age three months than infan receiving breast milk.

2. Gain in average stature between three and si months of age is not appreciably different for infan fed human milk than for those given evaporated pasteurized milk.

. . . There is reasonably adequate research ev dence to support the generalization that infants give less than 150 U. S. P. units of supplementary vitami D daily from the first postnatal month tend to b come slightly shorter in average stature than infan receiving larger supplements. . . . The relevan studies, though several in number, do not justify th inference that rate of growth in stature is any diffe ent for infants fed from early ages on diets especiall reinforced with thiamine, the vitamin B complex, minerals, than for infants not given such additio but fed egg yolk, vegetables, fruits and whole gra cereals at the customary ages.

News and Comment

GENERAL NEWS

Report on a Five Year Experiment in the Combination of Open Air Medical and Psychotherapeutic Treatment in a Midland Town.—The Rambling House Open Air School and Children's Centre, Chesterfield, England, recently made a report on a five year experiment in the combination of open air medical and psychotherapeutic treatment of children. This center was "designed as an experimental attempt to combine the physical, intellectual and psychological approaches to children's problems. This arrangement makes it possible to do away with the usual distinction between the delinquent, the nervous, the retarded and the ill child, and to regard all sorts of varied conditions such as nervousness, chronic headaches, stealing, rheumatic pains, temper trantrums, bed-wetting, shyness, asthma, lassitude, school failure etc. merely as symptoms that something is wrong with THE CHILD; and to pursue investigations along three lines simultaneously to discover whether that something is physical, intellectual, emotional, or, as is so often the case, a combination of all three. When the condition has been diagnosed, this arrangement makes it possible for treatment to be carried out simultaneously along any of all of the three lines."

The summarized results of treatment compare favorably with the results of psychiatric clinics and clinics for organic diseases elsewhere. The workers have demonstrated that the two groups (the organically and the emotionally ill) can be treated together and that the scientific attitude toward the two groups should be the same.

Physicians Certified by American Board of Pediatrics.—The following physicians were certified as specialists by the American Board of Pediatrics after examinations in Chicago on May 12 and 13:

Dr. Mary Daniel Ames, Detroit; Dr. Dale Ellis Beverly, Chicago; Lieut. Leonard L. Braun (MC), U.S. N.R. (formerly Chicago); Dr. Glidden Lantry Brooks, Muskogee, Okla.; Dr. John William Buckley, Bridgeport, Conn.; Dr. Virginia Murray Cobb, Tucson, Ariz.; Dr. Frank Stephen Cross, Lansing, Mich.; Dr. Joel Fleet, New Orleans; Lieut. David Goldring, M.C., A.U.S. (formerly St. Louis); Dr. James Harrell Harris, Marshall, Texas; Lieut. John Howard Laubscher, M.C., A.U.S. (formerly Cleveland); Capt. Selby V. Love, M.C., A.U.S. (formerly Nashville, Tenn.); Dr. Sydney B. Mannel, Denver; Dr. Eugenia Elizabeth Murphy, Arlington, Va.; Dr. Sidney Rosin, Los Angeles; Dr. Vincent J. Rounds, Bakersfield, Calif.; Dr. Edward Sager, Chicago; Dr. Richard Edward Wolf, Cincinnati.

Directory of Pediatric Societies *

INTERNATIONAL

International Association of Preventive Pediatrics

President: Prof. S. Monrad, Dronning Louises Børnehospital, Copenhagen, Denmark.
Secretary: Dr. Daniel Oltramare, 15 Rue Lévrier, Geneva, Switzerland.

International Congress of Pediatrics

President: Dr. Henry F. Helmholz, Mayo Clinic, Rochester, Minn.
Secretary-General: Dr. L. Emmett Holt Jr., 477 First Ave., New York 16.
Canadian Committee:
Chairman: Dr. Alan Brown, Hospital for Sick Children, 67 College St., Toronto.
Secretary: Dr. H. P. Wright, 1509 Sherbrooke St. W., Montreal.
Place: New York. Time: Postponed indefinitely.

International Congress for the Protection of Infancy

Secretary: Prof. G. B. Allaria, Corso Bramante 29, Torino 120, Italy.

FOREIGN

Argentine Pediatric Society of Buenos Aires

President: Dr. Martin Ramón Arana, 1809 Rodriguez Peña, Buenos Aires.
General Secretary: Dr. Alfredo Larguia, Cerrito 1179, Buenos Aires.

Associação Paulista de Medicina, Section on Pediatrics

President: Dr. Vicente Laro.
First Secretary: Dr. Armando de Arruda Sampalo.
Second Secretary: Dr. Luiz Augusto de Toledo, Av. Brigadeiro Luiz Antonio 393, 1° Andar, São Paulo, Brazil.
Time: Twelfth of every month, 8:30 p. m.

British Paediatric Association

President: Prof. L. G. Parsons, 58 Calthorpe Rd., Five Ways, Birmingham.
Secretary: Dr. Donald Paterson, 27 Devonshire Pl., London, W. 1.

Danish Pediatric Society

President: Dr. E. Lenstrup, Copenhagen.
Secretary: Dr. E. Gjørup, Dronning Louises Børnehospital, Copenhagen.

Nederlandische Vereeniging voor Kindergeneeskunde

President: Dr. J. H. G. Carstens, Servaasbolwerk 14ª, Utrecht.
Secretary: Dr. R. P. van de Kasteele, Laan van Poot 340, 's Gravenhage.
Place: Different places. Time: Three times a year.

Paediatrický Spolok na Slovensku

President: Dr. A. J. C. Chura, Lazaretská 11, Bratislava
Secretary: Dr. P. Rados, Lazaretská 6, Bratislava.
Place: Pediatric Clinic, University Bratislava. Time: Six times year.

Royal Society of Medicine, Section for the Study of Disease in Children

President: Dr. E. A. Cockayne, 98 Harley St., London W. 1, England.
Secretary: Dr. R. Lightwood, 86 Brook St., London W. 1, England.
Place: 1 Wimpole St., London. Time: Fourth Friday of each month, 4:15 p. m.

Palestine Jewish Medical Association, Section of Physicians of Children's Diseases

President: Prof. S. Rosenbaum, 26 Bialkstr., Tel Aviv
Secretary: Dr. A. Brünn, 9 Maazestre, Tel Aviv.

Sociedad Cubana de Pediatria

President: Dr. Angel A. Aballí Arellano, 17 No. 60 Vedado, Habana.
Secretary: Dr. Julio G. Cabrera Calderin, Hospital Mercedes L y 21 (Vedado), Box 2430, Habana.
Place: Cátedra de Clinica Infantil, Hospital Mercedes Habana. Time: Last Wednesday of every month.

Sociedad Mexicana de Pediatria

President: Dr. Fernando López Clares, 12/a. Medellin 191, Mexico.
Secretary: Dr. Jesus Gómez Pagola, Versalles 6 Mexico.

Sociedad de Pediatría de Santiago de Cuba

President: Dr. Antonio Beguez Cesar, Sagarra 107 Santiago de Cuba.
Secretary: Dra. Susana Texido Vaillant, Padre Pico 57, Santiago de Cuba.

Sociedad Venezolana de Puericultura y Pediatria

President: Dr. E. Santos Mendoza.
Secretary: Dr. P. Oropeza, Hospital de Niños, Caracas

Société de Pédiatrie de Paris

President: Dr. B. Weill-Hallé, 49 Avenue Raymond Poincaire, Paris, France.
Secretary: Dr. Jean Hallé, 10 bis Rue Pré aux Clercs Paris, France.
Place: Hôpital des Enfants Maladies, 49 Rue de Sèvres Time: 4:30 p. m., third Thursday of every month

Uruguayan Society of Pediatrics

President: Dr. José Alberto Praderi, Eduardo Acevedo 1132, Montevideo.
Secretary: Dr. Héctor Fossatti, Durazno 1882, Montevideo.

NATIONAL

American Medical Association, Scientific Assembly, Section on Pediatrics

Chairman: Dr. John Aikman, 184 Alexander St. Rochester, N. Y.
Secretary: Dr. Gilbert J. Levy, 188 S. Bellevue Blvd. Memphis, Tenn.
In compliance with the request of the Office of Defense Transportation and in the interest of the national war effort a meeting will not be held in 1945.

* Secretaries of societies are requested to furnish the information necessary to make this list complete and to keep it up to date.

American Academy of Pediatrics

President: Dr. Joseph S. Wall, 1864 Wyoming Ave. N. W., Washington, D. C.
Secretary: Dr. Clifford G. Grulee, 636 Church St., Evanston, Ill.

American Hospital Association, Children's Hospital Section

Chairman: Dr. Joelle C. Hiebert, 299 Main St., Lewiston, Maine.
Secretary: Dr. W. Franklin Wood, McLean Hospital, Waverly, Mass.

American Pediatric Society

President: Dr. C. Anderson Aldrich, 707 W. Fullerton Ave., Chicago.
Secretary-Treasurer: Dr. Hugh McCulloch, 325 N. Euclid Ave., St. Louis 8.

Canadian Society for the Study of Diseases of Children

President: Dr. H. S. Little, 300 Dufferin Ave., London, Ontario.
Secretary-Treasurer: Dr. Elizabeth Chant Robertson, 67 College St., Toronto 2.

Society for Pediatric Research

President: Dr. Edward M. Bridge, 219 Bryant St., Buffalo, N. Y.
Secretary: Dr. Mitchell I. Rubin, 1740 Bainbridge St., Philadelphia 46.

SECTIONAL

Intermountain Pediatric Society

President: Dr. Robert Alway, University of Utah School of Medicine, Salt Lake City 2.
Secretary-Treasurer: Dr. L. Paul Rasmussen, 1020 Boston Bldg., Salt Lake City 1.
Place: Salt Lake City General Hospital. Time: First Thursday of each month, 8 p. m.

New England Pediatric Society

President: Dr. William P. Buffum, 122 Waterman St., Providence, R. I.
Secretary-Treasurer: Dr. James Marvin Baty, 1101 Beacon St., Brookline, Mass.
Place: Boston Medical Library. Time: Three meetings a year, occurring from September to May.

North Pacific Pediatric Society

President: Dr. M. L. Bridgeman, 1020 S. W. Taylor St., Portland, Ore.
Secretary: Dr. C. G. Ashley, 833 S. W. 11th Ave., Portland, Ore.

Northwestern Pediatric Society

President: Dr. George B. Logan, 102 Second Ave. S. W., Rochester, Minn.
Secretary-Treasurer: Dr. Northrop Beach, 1009 Nicollet Ave., Minneapolis.
Place: Minneapolis, St. Paul, Duluth and Rochester. Time: January, April, July and October.

Rocky Mountain Pediatric Society

President: Dr. G. R. Fisher, 23 E. Pikes Peak Ave., Colorado Springs, Colo.
Secretary: Dr. Joseph H. Lyday, 1850 Gilpin St., Denver.

Southern Medical Association, Section of Pediatrics

Chairman: Dr. William Weston Jr., 1428 Lady St., Columbia, S. C.
Secretary: Dr. Angus McBryde, 604 W. Chapel Hill St., Durham, N. C.

STATE

Alabama Pediatric Society

President: Dr. Jerome C. Chapman, 2160 Highland Ave., Birmingham.
Secretary-Treasurer: Dr. Ruth Berrey, 2021–6th Ave. N., Birmingham.

Arizona Pediatric Society

President: Dr. Vivian Tappan, San Clemente, Tucson.
Secretary: Dr. Hilda Kroeger, Arizona State Health Dept. (Maternal and Child Welfare Division), Phoenix.

Arkansas State Pediatric Association

Chairman: Dr. C. B. Billingsley, 1425 N. 11th St., Fort Smith.
Secretary: Dr. R. E. Weddington, 1425 N. 11th St., Fort Smith.

California State Medical Society, Section on Pediatrics

Chairman: Dr. Charles W. Leach, 2000 Van Ness Ave., San Francisco 9.
Secretary: Dr. Chester I. Mead, 1930 Truxton Ave., Bakersfield.

Florida State Pediatric Society

President: Dr. Ludo Von Meysenbug, Box 3356, Daytona Beach.
Secretary: Dr. Robert Blessing, 409 Blount Bldg., Ft. Lauderdale.
Place: Concurrent with state association meeting at time of convention.

Georgia Pediatric Society

President: Dr. Ruskin King, 10 W. Taylor St., Savannah.
Secretary-Treasurer: Dr. Don F. Cathcart, 478 Peachtree St. N. E., Atlanta.

Hezekiah Beardsley Pediatric Club of Connecticut

President: Dr. Edward T. Wakeman, 129 Whitney Ave., New Haven.
Secretary: Dr. Herman Yannet, Southbury Training School, Southbury.
Time: Three meetings a year.

Illinois State Medical Society, Section on Pediatrics

Chairman: Dr. Craig D. Butler, 715 Lake St., Oak Park.
Secretary: Dr. A. J. Fletcher, 139 N. Vermilion, Danville.

Indiana State Pediatric Society

President: Dr. K. T. Knode, 1105 E. Jefferson Bldg., South Bend.
Secretary-Treasurer: Dr. Mathew Winters, 621 Hume Mansur Bldg., Indianapolis.
Time: Two meetings a year.

Iowa Pediatric Society

President: Dr. Mark L. Floyd, Children's Hospital, Iowa City.
Secretary-Treasurer: Dr. James Dunn, Davenport Bank Bldg., Davenport.

Medical Society of State of New York, Section on Pediatrics

Chairman: Dr. A. Clement Silverman, 608 E. Genesee St., Syracuse.
Secretary: Dr. Albert G. Davis, 307 Gas and Electric Bldg., Utica.

Medical Society of the State of Pennsylvania, Pediatric Section

Chairman: Dr. Elwood W. Stitzel, 403 Central Trust Bldg., Altoona, Pa.
Secretary: Dr. P. F. Lucchesi, Philadelphia Hospital, Philadelphia.

Michigan State Medical Society, Pediatric Section

Chairman: Dr. Charles F. McKhann, University Hospital, Ann Arbor.
Secretary: Dr. Mark F. Osterlin, Central Michigan Children's Clinic, Traverse City.

Mississippi State Pediatric Society

President: Dr. Harvey F. Garrison Jr., 315 E. Capitol Pl., Jackson.
Secretary: Dr. Guy Verner, 126 N. Congress St., Jackson.

Nebraska Pediatric Society

President: Dr. John L. Gedgoud, University of Nebraska Hospital, Omaha.
Secretary-Treasurer: Dr. Gerald C. O'Neil, 640 City National Bank Bldg., Omaha.
Place: As announced by committee. Time: Third Thursday of each month from October to June, inclusive. Dinner at 6 p. m.

New Hampshire Pediatric Society

President: Dr. MacLean J. Gill, 14 N. State St., Concord.
Secretary-Treasurer: Dr. Ursula G. Sanders, 46 Pleasant St., Concord.
Time: Twice yearly.

North Carolina Pediatric Society

President: Dr. Arthur H. London Jr., 1105 W. Main St., Durham.
Secretary: Dr. Jay M. Arena, Duke Hospital, Durham.

Oklahoma State Pediatric Society

President: Dr. Ben H. Nicholson, 301 N. W. 12th St., Oklahoma City.
Secretary: Dr. Luvern Hays, 108 W. 6th St., Tulsa.
Place: Oklahoma Club. Time: 6:30 p. m., fourth Friday of each alternate month from September to May, inclusive.

South Carolina Pediatric Society

President: Dr. Lonita Boggs, 301 E. Coffee St., Greenville.
Secretary-Treasurer: Dr. Hilla Sheriff, 429 Wade Hampton Office Bldg., Columbia 10.

Texas Pediatric Society

President: Dr. F. H. Lancaster, 4409 Fannin St., Houston.
Secretary-Treasurer: Dr. John E. Ashby, 3610 Fairmount Ave., Dallas.

Virginia Pediatric Society

President: Dr. L. E. Sutton Jr., Medical College Hospital, Richmond.
Secretary: Dr. Emily Gardner, 1100 W. Franklin St., Richmond 20.

West Virginia State Medical Society, Section on Pediatrics

President: Dr. Andrew Amick, 1021 Quarrier St., Charleston.
Secretary: Dr. A. A. Shawkey, Professional Bldg., Charleston.

LOCAL

Academy of Medicine of Cleveland Pediatric Section

Chairman: Dr. Charles L. Ruggles, 10515 Carnegie Ave., Cleveland.
Secretary: Dr. Walter Heymann, 2103 Adelbert Rd., Cleveland.
Place: Cleveland Medical Library Bldg. Time: 8:1[illegible] p. m., October, December, February and April.

Academy of Medicine, Toronto, Section of Pediatrics

President: Dr. I. Nelles Silverthorne, 170 St. George St., Toronto, Canada.
Secretary: Dr. G. P. Hamblin, 2333 Bloor St. W., Toronto, Canada.

Bronx Pediatric Society

President: Dr. Jacob H. Turner, 121 W. 197th St., New York.
Secretary: Dr. Harry S. Pizer, 1726 Davidson Ave., New York.
Place: Concourse Plaza Hotel, 161st St. and Grand Concourse. Time: Second Wednesday of each month except June, July, August and September.

Brooklyn Academy of Pediatrics

President: Dr. Kenneth G. Jennings, 159 Midwood St., Brooklyn.
Secretary: Dr. Joseph Battaglia, 713 Bushwick Ave., Brooklyn 21.
Place: Granada Hotel. Time: 8:45 p. m., fourth Wednesday of each month except May, June, July, August and September.

Buffalo Pediatric Society

President: Dr. A. Wilmot Jacobsen, 187 Bryant St., Buffalo, N. Y.
Secretary: Dr. Richard A. Downey, 786 Forest Ave., Buffalo 9, N. Y.
Place: Children's Hospital, 219 Bryant St. Time: 8:3[illegible] p. m., first Monday of each month from September to June.

Central New York Pediatric Club

President: Dr. Arthur W. Benson, 2 St. Pauls St., Troy
Secretary Dr. Frank J. Williams, 58 S. Swan St., Albany.
Places: Various cities in New York. Time: Third Tuesday of April and October.

Chicago Pediatric Society

President: Dr. Morley D. McNeal, 2 N. Sheridan Rd., Highland Park, Ill.
Secretary: Dr. Henry G. Poncher, 1819 W. Polk St., Chicago.
Place: Children's Memorial Hospital, 710 Fullerton Ave. Time: Third Tuesday of each month, October to May, inclusive.

Cincinnati Pediatric Society

President: Dr. Lloyd K. Felter, 3144 Jefferson Ave., Cincinnati.
Secretary: Dr. T. Selkirk, 3530 Reading Rd., Cincinnati.
Place: Children's Hospital, Elland Ave., Cincinnati. Time: On call.

Dallas Pediatric Society

President: Dr. Robert A. Knox, 3701 Fairmount Ave., Dallas 4, Texas.
Secretary-Treasurer: Dr. Gladys J. Fashena, 4585 Belfort Pl., Dallas 4, Texas.
Place: Children's Medical Center. Time: 1 p. m., second and fourth Saturdays of each month.

Detroit Pediatric Society

President: Dr. Philip J. Howard, 2977 W. Grand Blvd., Detroit, Mich.
Secretary: Dr. John C. Montgomery, 564 Fisher Bldg., Detroit 2, Mich.
Place: Wayne County Medical Society. Time: 8:30 p. m., second Wednesday of each month, four meetings a year.

Fulton County Medical Society, Pediatrics Section (Atlanta, Ga.)

Chairman: Dr. Don F. Cathcart, 478 Peachtree St. N. E., Atlanta.
Secretary: Dr. Harry Lange, 478 Peachtree St. N. E., Atlanta.
Place: Academy of Medicine, 38 Prescott St. N. E. Time: Second Thursday of each month from October to April, 8 p. m.

Houston Pediatric Society

President: Dr. Raymond Cohen, 2300 Caroline St., Houston, Texas.
Secretary: Dr. Betty Moody, 526 Richmond Rd., Houston, Texas.
Place: College Inn, Houston. Time: Fourth Monday of each month.

Kansas City (Missouri) Pediatric Society

President: Dr. Edwin H. Schorer, 1103 Grand Ave., Kansas City.
Secretary: Dr. H. E. Petersen, Kirkpatrick Bldg., St. Joseph, Mo.
Place: Kansas City General Hospital. Time: On call.

Los Angeles County Medical Association, Pediatric Section

President: Dr. Milo B. Brooks, 1033 Gayley Ave., West Los Angeles.
Secretary-Treasurer: Dr. Elena Boder, 1830½ Lucille Ave., Los Angeles 26.
Place: Los Angeles County Medical Headquarters, 1925 Wilshire Blvd. Time: Second Monday of February, April, June, October and December.

Medical Society of the County of Kings and the Academy of Medicine of Brooklyn, Pediatric Section

President: Dr. Abraham M. Litvak, 1145 Eastern Parkway, Brooklyn.
Secretary: Dr. Harold Levy, 750 St. Marks Ave., Brooklyn.
Place: 1313 Bedford Ave., Brooklyn. Time: 9:00 p. m., fourth Monday of each month, October to April, inclusive.

Medical Society of the County of Queens, Inc., Section on Pediatrics

Chairman: Dr. Meyeron Coe, 217-02–91st Ave., Queens Village, N. Y.
Secretary-Treasurer: Dr. Edith A. Mittell, 144–38th Ave., Flushing, N. Y.
Place: Queens County Medical Bldg., Forest Hills, N. Y. Time: Third Monday of October, January, March and May.

Medical Society of the District of Columbia, Section on Pediatrics

President: Dr. Harry A. Spigel, 2647 Connecticut Ave., Washington, D. C.
Secretary-Treasurer: Dr. Perry W. Gard, 2520 Woodley Rd., Washington, D. C.
Place: Medical Society Bldg., 1718 M St. N. W. Time: 8 p. m., fourth Thursday of every month.

Memphis Pediatric Society

President: Dr. F. T. Mitchell, 376 S. Bellevue Ave., Memphis, Tenn.
Secretary-Treasurer: Dr. Harry Jacobson, 1193 Madison Ave., Memphis, Tenn.
Place: John Gaston Hospital. Time: Quarterly.

Milwaukee Pediatric Society

President: Dr. M. G. Peterman, 411 E. Mason St., Milwaukee 2.
Secretary-Treasurer: Dr. B. J. Malnekoff, 3213 N. Marietta Ave., Milwaukee.
Place: Milwaukee Athletic Club. Time: Second Wednesday of each alternate month, beginning with February.

New York Academy of Medicine, Section of Pediatrics

Chairman: Dr. Alfred E. Fischer, 73 E. 90th St., New York.
Secretary: Dr. Robert O. Du Bois, 122 E. 76th St., New York.
Place: New York Academy of Medicine, 2 E. 103d St. Time: Second Thursday of each month from October to May, inclusive, 8:30 p. m.

Northern California Pediatric Society

President: Dr. John Mott Rector, 2000 Van Ness Ave., San Francisco.
Secretary: Dr. George Bates, 490 Post St., San Francisco 2.
Time: Four times yearly.

Oklahoma City Pediatric Society

President: Dr. William M. Taylor, 1200 N. Walker St., Oklahoma City.
Secretary: Dr. G. R. Felts, 625 N. W. 10th St., Oklahoma City.
Place: Oklahoma Club. Time: Third Thursday of each month.

Philadelphia Pediatric Society

President: Dr. Ruth Hartley Weaver, 1719 Rittenhouse St., Philadelphia.
Secretary: Dr. Sherman Little, 1740 Bainbridge St., Philadelphia 46.
Place: College of Physicians, 19 S. 22d St. Time: 8:30 p. m., second Tuesday in October, December, February and May.

Pittsburgh Pediatric Society

President: Dr. Elwood Stitzel, 403 Central Trust Bldg., Altoona, Pa.
Secretary-Treasurer: Dr. C. J. Stoecklein, Medical Arts Bldg., Pittsburgh 13.
Place: Pittsburgh Academy of Medicine. Time: Second Friday, alternate month from October to June, inclusive.

Richmond Pediatric Society

President: Dr. T. Stanley Meade, 913 Floyd Ave., Richmond, Va.
Secretary-Treasurer: Dr. Edwin L. Kendig Jr., 828 W. Franklin St., Richmond 20, Va.
Place: Richmond Academy of Medicine, 1200 E. Clay St. Time: 8 p. m., third Thursday of each month, except June, July and August.

Rochester Pediatric Society

President: Dr. William L. Bradford, 260 Crittenden Blvd., Rochester 7, N. Y.
Secretary-Treasurer: Dr. Donald D. Posson, 222 Chili Ave., Rochester 11, N. Y.
Place: Rochester Academy of Medicine or arrangement by program committee. Time: Third Friday of each month from October to May.

St. Louis Pediatric Society

President: Dr. Peter G. Danis, 634 N. Grand Ave., St. Louis 3.
Secretary-Treasurer: Dr. H. Ewing Wachter, 3720 Washington Ave., St. Louis 8.
Place: Branscome Hotel. Time: 7:00 p. m., third Thursday of each month from November to June.

Seattle Pediatric Society

President: Dr. Frederick B. Joy, Stimson Bldg., Seattl
Secretary: Dr. Sherod M. Billington, Medical Dent Bldg., Seattle.
Place: College Club. Time: Third Friday of ea month from September to June at 6:30 p. m.

Southwestern Pediatric Society

President: Dr. William Belford, 420 Walnut St., Sa Diego, Calif.
Secretary: Dr. Robert J. Dostal, 710 Wilshire Blvd Santa Monica, Calif.
Place: University Club of Los Angeles. Time: Fir Wednesday in January, March, May, September an November.

University of Michigan Pediatric and Infectious Disease Society

President: Dr. Campbell Harvey, 35 W. Huron St Pontiac, Mich.
Secretary: Dr. Harry A. Towsley, University of Mich igan, Department of Pediatrics and Communicabl Diseases, Ann Arbor, Mich.

Westchester County Medical Society, Pediatrics Section (New York)

President: Dr. John B. Ahouse, 27 Ludlow St., Yonker N. Y.
Secretary-Treasurer: Dr. Elvira Ostlund, 64 Highlan Rd., Rye, N. Y.
Place: Hospitals of Westchester County. Time: Thir Thursday in November, January, March and May.

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